PB-247 617

WATER QUALITY CONTROL THROUGH SINGLE CROP AGRICULTURE NUMBER 4

Kenneth R. Lundberg, et al

Bemidji State College

Prepared for:

Robert S. Kerr Environmental Research Laboratory

June 1975

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JUNE 1975

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TECHNICAL REPORT DATA
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1. REPORT NO.	2.	3. RECIPIENT'S ACCESSION NO.
EPA-660/2-75-026		PB247617

4. TITLE AND SUBTITLE	5. REPORT DATE
Water Quality Control Through Single Crop Agriculture, No. 4	6. PERFORMING ORGANIZATION CODE

7. AUTHOR(S)	8. PERFORMING ORGANIZATION REPORT NO.
Kenneth R. Lundberg Patrick T. Trihey	

9. PERFORMING ORGANIZATION NAME AND ADDRESS	10. PROGRAM ELEMENT NO.
Center for Environmental Studies Bemidji State College Bemidji, Minnesota 56601	1BB045 11. CONTRACT/GRANT NO. 802168 (16080 FQV)

12. SPONSORING AGENCY NAME AND ADDRESS	13. TYPE OF REPORT AND PERIOD COVERED
Robert S. Kerr Environmental Research Laboratory National Environmental Research Center P. O. Box 1198 Ada, Oklahoma 74820	Final- 7/1/70 - 10/1/73 14. SPONSORING AGENCY CODE

15. SUPPLEMENTARY NOTES

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16. ABSTRACT

A study was conducted to determine effects on water quality from flooded paddies used for the commercial culture of wild rice, Zizania aquatica. Water samples were taken from flooded impoundments on fertilized peat and mineral soils as well as unfertilized peat soils. Weekly changes in the chemical and physical parameters of water entering, within, and discharged from paddies were measured through the summer. No significant changes were observed in the receiving waters until fall draindown occurred when increases in dissolved solids, total Kjeldahl-nitrogen and total phosphorus occurred in the Clearwater River. Algal assay tests indicated that the increase in nutrients at peak discharge was sufficient to increase algal populations. The quantities of nutrients released from rice paddies were not significantly greater than would be expected in normal runoff in the area and much less than the amounts released from most agricultural endeavors.

Consumptive water use was found to be 20-22 inches per acre (51-56 cm/ha).

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Agricultural wastes Nitrogen Phosphorus Surface waters	Wild rice culture Nutrient control Peat soils	02/04

PRICES SUBJECT TO CHANGE

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS *(This Report)*	21. NO. OF PAGES
Release to public	Unclassified	128
	20. SECURITY CLASS *(This page)*	22. PRICE
	Unclassified	$6.00

EPA Form 2220-1 (9-73)

★ U. S. GOVERNMENT PRINTING OFFICE: 1975—699-154 /24 REGION 10

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JUNE 1975

WATER QUALITY CONTROL THROUGH SINGLE CROP AGRICULTURE

No. 4

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Grant No. 802168
ROAP 21 ASH, Task 17
Program Element 1BB045

Project Officer

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Ada, Oklahoma 74820

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ABSTRACT

A study was conducted to determine effects on water quality from flooded paddies used for the commercial culture of wild rice, Zizania aquatica. Water samples were taken from flooded impoundments on fertilized and unfertilized peat and mineral soils of northern Minnesota. Weekly changes in the chemical and physical parameters of the water entering the paddies, within selected paddies, and seepage water leaving the paddies were monitored throughout the summer. Sampling was increased in the receiving waters and discharge ditches during late summer draining of the paddies. No chemical changes were observed in the receiving waters until the fall drawdown occurred when increases in dissolved solids, total Kjeldahl-nitrogen, and total phosphorus occurred in the Clearwater River. Algal assay tests indicated that the increase in nutrients at peak discharge was sufficient to increase algal populations.

Studies of new and older developments indicated less nutrient release occurred from older paddies and mineral soils. Major soil disturbances were followed by increased turbidity and nutrient release. Consumptive water use was determined to be 20-22 inches per acre (51-56 cm/ha). The quantities of nutrients released from rice paddies were not significantly greater than would be expected in normal runoff in the area and much less than the amounts released from most agricultural endeavors.

This final report was submitted in fulfillment of Project Number 16080 FQV and Grant Number 802168 by the Center for Environmental Studies at Bemidji State College under the partial sponsorship of the Environmental Protection Agency. Field work was completed as of October 1, 1973.

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ACKNOWLEDGMENTS

The Tribal Council of the Red Lake Band of Chippewa Indians, the manager and directors of Clearwater Rice Incorporated, Messrs. James and Valmer Halama, and Lester Bohs are acknowledged with sincere thanks for the use of their paddies and management records. The support of the project by the Water Quality Control Branch, Environmental Protection Agency, and the help provided by Richard E. Thomas, the Grant Project Officer, are acknowledged with sincere thanks.

SECTION I

CONCLUSIONS

Significant increases in total phosphorus, Kjeldahl nitrogen and other parameters were observed in the Clearwater River concomitantly with the major discharge of commercial wild rice paddies. However, increases of the same magnitude were observed for these parameters following periods of heavy rain. The phosphorus release was greatest from first-year paddies applying balanced NPK fertilizers but decreased in the effluents from older fertilized paddies and was significantly less in paddies only applying nitrogen. The fertilizer phosphates appear to accumulate in the upper few inches of soil and are readily mobilized with any soil disturbance. No relationship between fertilizer use and the release of Kjeldahl nitrogen could be established. The release of Kjeldahl nitrogen appears to be associated with water flow over and through peat soils. Turbidity and filterable solids were released in greater concentrations from first-year paddies. Part of this increase was due to the erosion of poorly constructed discharge ditches. As the ditch banks stabilized there was a decrease in turbidity and filterable solids. The increased nutrient loading observed in the Clearwater River over that attributed to paddies was partially the result of the erosion of paddy ditches below the sampling sites. Stream flow and turbulance was great enough to prevent the settling of organic material between sampling sites on the river.

Phosphorus loading from the mineral paddies near Kelliher was not statistically significant but the increase of Kjeldahl-nitrogen in the Battle River was partially attributable to rice paddy effluents. Data from this site were too limited to adequately explain these phenomena.

Increases in phosphorus were noted in the discharge from the mineral-peat paddy development near Waskish. At this site there was no significant difference in the concentration of Kjeldahl-nitrogen and the other parameters between inlet and discharge water.

During the spring and summer growing season the seepage from commercial wild rice paddies did not appear to pose a threat to the receiving streams in the areas studied. Nevertheless, attempts should be made to recover and recycle this water since it represents a measurable water loss that must otherwise be made up from the inlet streams.

Algal assays indicated that sufficient nutrients entered the receiving streams during the discharge period to promote extensive algal growth. However, similar increases in potential productivity occurred naturally after heavy rains in the area. Due to the short duration of paddy discharges and the time of release it is doubtful that rice paddy effluents contribute significantly to the eutrophication of the receiving streams studied. Increased productivity could occur if the paddy water were discharged directly or indirectly into small lakes, particularly those of the soft water type.

The industry's major threat to the water courses is the overdeveloping of an area with regard to water supply. During years of little spring runoff or long summer drought the flow of rivers and streams could be reduced so that the needs of rice farmers and other developments along the river could not be met.

SECTION II

RECOMMENDATIONS

Uniform management practices have not been established in this new and developing industry. Considerable experimentation with paddy design, water level control, planting time, fertilizer application, and equipment utilization is being conducted by and for the industry. As a result of these studies changes may be made which will significantly affect water quality in the production areas. Based on current trends and management practices the following recommendations are made:

1. Extensive fertilizer trials should be conducted on peat soils to determine the effect phosphorus fertilizers have on wild rice yields. Until such a study is conducted phosphorus fertilizers should be used with caution on commercial wild rice paddies.

2. Prior to the thinning of rice paddies, water levels should be controlled so that no release of water occurs during thinning or within the following week.

3. The rate at which water is released could be reduced by extending the fall draindown period. This would minimize soil disturbances within the paddies and reduce erosion of the discharge ditches. When feasible the discharge should be made over flat land and slowly returned to the receiving stream.

4. More effort should be devoted to the construction and maintenance of dikes and discharge ditches to reduce erosion.

5. Paddy developments should be designed to return water lost through seepage back to the paddies.

6. Appropriate State and Federal agencies should carefully balance water appropriation permits with available water supply. These agencies should cooperate with the rice producers in formulating procedures for equitably distributing water resources during drought periods.

7. The development of paddies should be restricted along water courses low in alkalinity, hardness, and dissolved solids. No developments should be allowed on the shores of soft-water lakes.

SECTION III

INTRODUCTION

OVERVIEW OF THE PROBLEM

Wild rice (Zizania aquatic L.) has grown naturally in many lakes and streams in Minnesota for centuries. With the first successful attempts at cultivating wild rice in paddies in 1960 a new industry was born.

The rapid growth of the wild rice industry and the intimate association of this incipient industry with the aquatic environment have caused concern for the lakes and streams of northern Minnesota. Low lying bogs, grassland, and, to a lesser degree, forestland riparian to lakes and streams have been cleared, leveled, ditched, roto-tilled, diked, and put in rice production. As spring breakup occurs the paddies are flooded to a depth of six to twelve inches (15 to 30cm) and maintained until early August. Of major concern is the summer seepage water, occasional overflow water, and paddy water discharged during August to dry the paddies. Seed germination occurs as the water reaches 3-5^{o}C with the first visible submerged ribbon-like leaves appearing near the first of May. By mid-May the floating stage is reached. At this time mechanical thinning of paddies that have been in production two or more years occurs to prevent the rice from becoming too thick. By early June the first leaves become upright and the paddy takes on the appearance of a grassy field. The develop-

ment of the rice panicles is apparent by mid-July. During early August the paddies are drained to allow the soil to become dry enough to be mechanically harvested with combines. In the study area, the rice ripens over a two-week period starting in late August. Most harvesting is now done with modified white rice combines. Since wild rice is a shattering grain, the rice kernels fall to the ground as they ripen; up to 50 percent of the rice is lost in this manner as ripening occurs. The fallen kernels act as seed for succeeding years greatly overseeding the paddy. Once better strains of wild rice are developed, yields will increase and problems of overseeding in the older paddies will be reduced.

Most of the present rice production is located in northern Minnesota on low, flat land west and east of Red Lake, in the Leech Lake area and in Aitkin County, although commercial developments are also found in northern Wisconsin and Canada at this time. The potential for out-of-state production follows the natural stands of wild rice east from Minnesota to the Atlantic coast and southward into Florida. The rapid development of this industry in Minnesota saw an increase from 900 acres (360 ha) to 17,000 acres (6,900 ha) during the years 1969-1972.[1] Poor market conditions, cost of new development, the increased prices for upland grains, the lack of a good disease-resistant nonshattering seed, and the introduction of crop rotation have slowed development. During 1974 Minnesota's acreage was estimated to be 13,000 acres (5,300 ha).[2] As market conditions improve, the industry will continue to develop on low, flat land with adequate water supplies to maintain flooded paddies until early August.

GENERAL DESCRIPTION OF THE STUDY AREA

Clearwater River Basin

The sites monitored from 1970 to 1973 consisted of four commercial wild rice developments located in north central Minnesota. Two of these developments, Clearwater Rice, (1971-1973) and the Ki-Wo-Say paddies, (1970-1973) are located in the Clearwater River basin. The remaining sites were located near Upper Red Lake in northern Beltrami County. One was two miles (3.2 km) northeast of Waskish, (1971-73) and the other was four miles (6.4 km) west of Kelliher along Highway 38, (1973).

The Clearwater Rice development consisted of two major paddy systems of 600 and 1,000 acres (240 and 400 ha) located on opposite sides of the Clearwater River. The total acreage of the complex was close to 2,000 acres (810 ha) when including two other operations directly bordering Clearwater Rice. Portions of the 600 acre (240 ha) tract have been cultivated since 1968 and have been the site of intensive investigation. The paddies were constructed on sapric peat ranging in depth from 16 to 40 inches (41 to 101 cm) over a sandy loam base. Samples were collected on a weekly basis from the Clearwater River above the paddies, from selected paddies, and from a 2,200-foot (670 m) ditch containing some bog runoff and seepage water from adjacent paddies. During the August discharge period, daily samples were taken from the main drainage ditches to the river.

The Ki-Wo-Say paddies are located near the southwestern border of the Red Lake Indian Reservation adjacent to the Clearwater River approximately 10 miles (16 km) downstream from the Clearwater Rice development. There is no specific classification for the peat soils on

which the Ki-Wo-Say paddies were constructed but they were similar in texture and organic composition to the soils at Clearwater Rice. The peat varies in depth from 4 to 6 feet (1.2 to 1.8 m) over a clay base. By 1973, 160 of the planned 180 acres (65 of 73 ha) were in production. Samples were collected weekly from the Ki-Wo-Say Wild Life Area bog, which was the source of water for all the paddies; from one paddy; and from the outlet ditch which contained seepage water from five paddies. During the August 1973 drawdown, the ditch was monitored daily.

The Clearwater River was monitored at 3 major sites. One site was above all rice producing areas, one was 4 miles (6.4 km) below Clearwater Rice at the Highway 10 bridge, and one 10 miles (16 km) below the Ki-Wo-Say paddies at the Polk County Highway 2 bridge. During 1973, samples were collected weekly until the drawdown period when samples were taken daily. Prior to 1973, the Polk County site was only monitored during the 1972 discharge period. By 1973 approximately 4,000 acres (1,600 ha) of rice were in production between the Polk County site and the one located above Clearwater Rice. Estimates of water flow during drawdown were made during 1973 at the three major river sampling sites. The Clearwater River was the main source of water for all paddies in the area. All water lost through surface seepage, overflow and fall draining of the paddies returned to the Clearwater River.

In rice growing areas, the gradient of the river is very flat as is the surrounding land. Starting in 1951, the U.S. Army Corp of Engineers did extensive ditching and channelizing of the river and surrounding area to develop farmland. The overall quality of the river water is suitable for recreation and municipal use but little or no recrea-

tional development has taken place nor is any anticipated at this time.

Stations monitoring waterflow have been maintained at Leonard, 15 miles (24 km) above the study area, and at Plummer, approximately 30 miles (48 km) below the study area. At Leonard, the stream drained 153 square miles (396 km^2) of area and had a minimum discharge of 2 cubic feet (56.6 l) per second with an average discharge of 61.7 C. F.S. (1,747 l/sec) during a period from 1935 to 1945. At Plummer, the watershed was 512 square miles (1,300 km^2) with a minimum stream discharge of 7.9 C.F.S. (223.6 l/sec) and an average discharge of 178 C.F.S. (5,039 l/sec) from 1940 to 1973. The average flow of the Clearwater River during the rice growing season from April through July was 320 C.F.S. (9,060 l/sec).[3]

The climate of the Clearwater watershed is moderate with an average temperature of approximately 39 degrees, (3.9°C). Average monthly temperatures range from a low of 3.3 degrees (-16°C) for January to a high of 69.2 degrees (20.7°C) for August. The April to August growing season average is 53 degrees (11.7°C). The average annual rainfall in the region since 1890 has been 22 inches (56 cm). Of this amount 19.4 inches (49 cm) was lost; largely through evapotranspiration. With adequate moisture, evapotranspiration losses could be as high as 22.6 inches (57.4 cm).[4] A U.S. Army Corp of Engineers survey stated annual evaporation losses from one square mile (259 ha) of lake or reservoir would be 1.8 cubic feet (51 l) per second or 25 inches (64 cm) per year. Even with these losses "there appears to be adequate flow in the river during normal years for irrigation."[3]

Red Lake Basin

The paddy system studied near Waskish, was located in an area of primarily organic soils. The burning of portions of the peat and subsequent agriculture resulted in the formation of small areas of mineral soils. The mineral paddy investigated in this study was classified as belonging to the Chilgren series; a mixture of gley over grey wooded soils.[5] This and adjacent paddies received their water from peat bogs by means of drainage ditches. The discharge from these paddies ultimately entered the Tamarac River which flows into Upper Red Lake, as shown in Figure 1, a general map of the study area. For detailed maps of the paddies and sampling sites the reader is referred to the 1971 report, Water Quality Control Through Single Crop Agriculture.[6] When mineral paddies were removed from production at Waskish, similar paddies were added 4 miles (6.4 km) west of Kelliher along the Battle River. Samples were collected weekly from the Battle River above the paddies and within two paddies. During the August drawdown, discharge and river samples were taken daily.

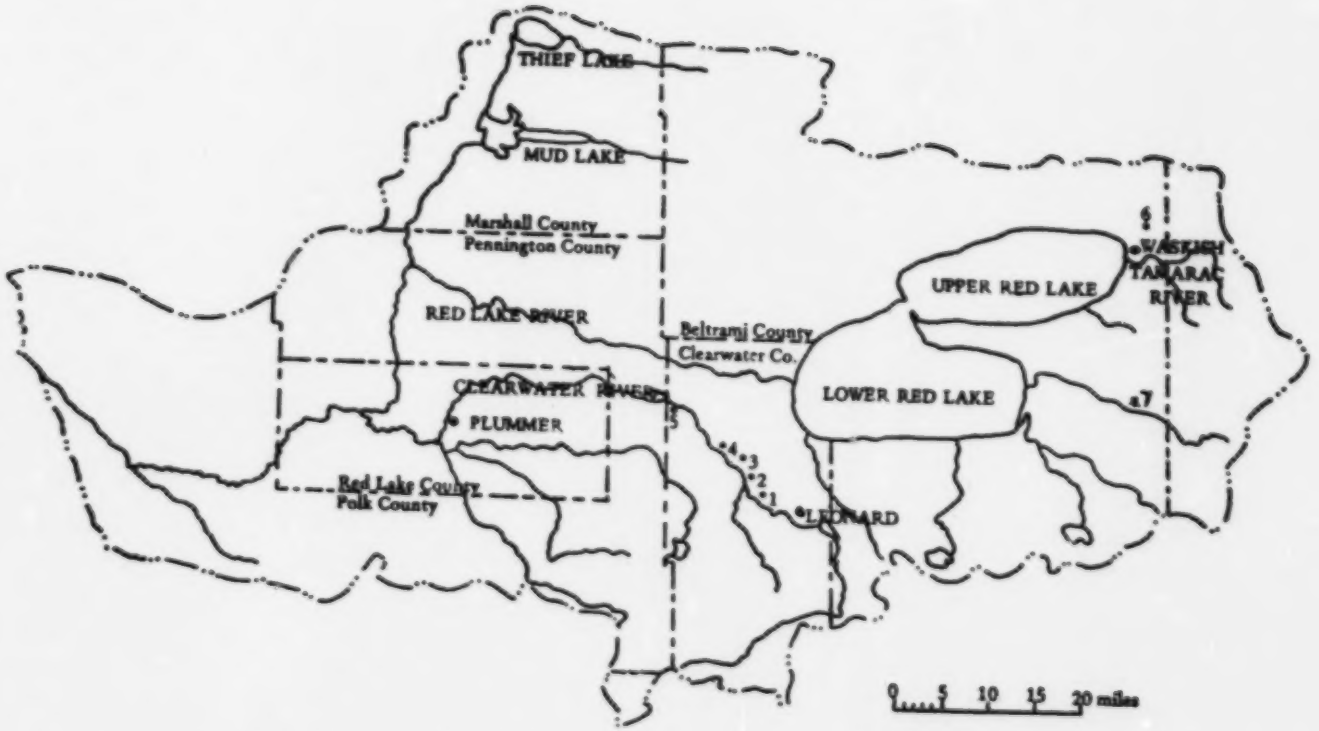

Figure 1. A map of the Red Lake River Watershed showing the general location of sampling sites. 1 is a station located upstream from all rice paddies on the Clearwater River. 2 marks the location of the fertilized organic paddies of Clearwater Rice. 3 locates a river station below 2,000 acres. 4 locates the unfertilized Ki-Wo-Say paddies. 5 is a river station below 4,000 acres of paddies. 6 marks the location of the mineral paddies near Waskish. 7 marks the location of the mineral paddies near Kelliher.

LOCATION AND DESCRIPTION OF SAMPLE SITES

Site 100 (CWB-1) was located on the Clearwater River above any paddy developments. Samples were collected from the river near the bridge on Clearwater County Highway FAS 11, 1.5 miles (2.4 km) above the pumping station for Clearwater Rice, Inc.

Site 101 was located at the pumping station for the Clearwater Rice Inc. This site was sampled in 1971 and 1972 prior to the development of additional paddies on the west side of the Clearwater River.

Site 105 was a 40-acre (16 ha) paddy located on sapric peat soil. The paddy was only sampled in 1973, but had been in production since 1968. This paddy annually received a fall application of 18-18-17 NPK fertilizer at the rate of 250 to 300 pounds per acre (280-336 kg/ha) and a July treatment of ammonium nitrate at 50-100 pounds per acre (56-112 kg/ha).

Site 115 was a 20-acre (8.1 ha) rice paddy located just to the east of site 105. Both paddies shared in common a 1,300 foot (396 m) dike. Site 115 received the same fertilizer treatment as site 105.

Site 125 (SKP-3) was a 20-acre (8.1 ha) rice paddy located to the east of site 115. This paddy shared a 1,300 foot (396 m) dike in common with site 115. Site 125 received the same fertilizer treatment as site 105. This paddy had been regularly sampled since 1971 because of its accessibility.

Site 140 (SKM-D) was a discharge ditch one quarter of a mile west of

Site 140 (cont.)

site 105. This ditch which contained only water during the discharge period drained sites 105, 115, 125, plus an additional 300 acres (120 ha) of similarly managed paddies. This ditch emptied into the Clearwater River approximately 1.75 miles (2.8 km) downstream from site 100.

Site 145 (SKP-E) was an 80-acre (33 ha) paddy on sapric peat soil located approximately one-half mile (.8 km) north of site 105. This paddy had been in production since 1969 and had been receiving fall applications of NPK fertilizers and July applications of ammonium nitrate. Seepage water from the south dike entered a 2,200 foot (670 m) ditch, site 160.

Site 155 (SKP-W) was a 20-acre (8.1 ha) paddy on the south side of the 2,200 foot (670 m) ditch. This ditch received both seepage and discharge from site 155. This paddy, in production since 1969, was managed in a manner similar to site 105.

Site 160 (SK4-D) was located near the mouth of a 2,200 foot (670 m) ditch bordered by fertilized peat paddies. This ditch cut through the shallow peat into a sandy loam soil. The spoils from the ditch were used to construct the adjacent paddy dikes for sites 145 and 155. Water flowing in the ditch was a combination of seepage, bog drainage, and paddy effluents. This ditch emptied into the Clearwater River 2 miles (3.2 km) below site 100.

Site 200 was located on Ruffy Brook, one source of water for approximately 1,000 acres (405 ha) of paddies developed in 1972.

Site 200 (cont.)
Samples were collected near the bridge on Clearwater County FAS 11, one-half mile (.8 km) south of the paddies.

Site 210 was located on Ruffy Brook below the paddies and approximately .25 miles (.4 km) above the confluence with the Clearwater River. At this point Ruffy Brook contained part of its normal flow, seepage water, and during the fall discharge the effluent from approximately 400 acres (162 ha) of new paddies.

Site 215 was a 200-acre (81 ha) paddy on the west side of the Clearwater River adjacent to Clearwater County CSAH 5. This paddy in its first-year of production had received a fall application of NPK fertilizer and an aerial application of ammonium nitrate in July.

Site 220 was located on a discharge ditch which drained a number of first year paddies on the west side of Clearwater River. This ditch contained only paddy effluents which flowed into Ruffy Brook below site 210.

Site 300 (CWB-2) was located on the Clearwater River approximately 4 miles (6.4 km) below the 2,000 acres (810 ha) of paddies. Samples were collected near the bridge on Clearwater County 10 at the southwest corner of the Red Lake Indian Reservation.

Site 400 (WLA) was located near a culvert that contained water flowing from a 6,000-acre (2,400 ha) marsh called the Ki-Wo-Say Wildlife Area. The marsh on peat soil was drained in the

Site 400 (cont.)

fall and flooded in the spring with water from the Clearwater River and run-off water from surrounding forested areas. The culvert drain from the marsh served as the source of water for the unfertilized peat soil paddies on the southwest corner of the Red Lake Indian Reservation.

Site 405 (3P) was located in an unfertilized 20-acre (8.1 ha) paddy on the Red Lake Indian Reservation. This paddy constructed on heavy peat was put into production in 1970.

Site 410 (3D) was located in a 1,200 foot (370 m) drainage ditch which bordered the west side of site 405 and two other 20-acre (8.1 ha) paddies. In 1973 an additional 60 acres (24 ha) of paddies were put into production on the west side of the ditch. During the summer the ditch contained seepage from the paddies which was monitored by measuring the level over a v-notch weir. Paddy discharge entered the ditch during August drawdown.

Site 500 was located on the Clearwater River below the point where discharge from site 410 entered.

Site 600 (CWB-3) was located on the Clearwater River approximately 17 miles (27 km) downstream and northwest of site 100. Samples were collected near the bridge on Polk County Highway CSAH 2, 12 miles (19.3 km) north of Gully, Minnesota. It was estimated that there were 4,000 acres (1,600 ha) of paddies in production between sites 100 and 600 in 1973.

Site 700 was located on the South Branch of the Battle River. Samples were taken near the bridge on Beltrami County Highway CSAH 36, 4 miles (6.4 km) west of Kelliher, Minnesota. This site was located near the source of water for the mineral paddies.

Site 700-A was located on the South Branch of the Battle River. Samples were taken near the bridge on Beltrami County Highway CSAH 38, 4.5 miles (7.2 km) west of Kelliher, Minnesota. This site was located three miles (4.8 km) downstream and west of the mineral paddies.

Site 705 was in a 40 acre (16 ha) paddy located on a sandy loam soil of the Nebish-Rockwood type. This paddy was placed in production in 1973. The discharge from this flowed through a ditch, site 710, to the South Branch of the Battle River.

Site 710 was on a discharge ditch which drained site 705. This ditch only contained water after heavy rains and during the fall discharge period.

Site 715 was in a paddy near the south bank of Hartman Creek. The soil in this paddy was a mineral soil of the Nebish-Rockwood type. The discharge from this 20-acre (8.1 ha) paddy flowed indirectly into the Battle River.

Site 801 (V3C) was located in a drainage ditch which crossed Beltrami County Highway CSAH 40, 2.75 miles (4.4 km) north and east of Waskish, Minnesota. This ditch supplied the water for

Site 801 (cont.)

the series of paddies. This ditch carried drainage from the large bog north of Waskish on Upper Red Lake.

Site 805 (V3P) was located on a paddy consisting of mineral soil of the Chilgren series which received its water from site 801. The paddy was in its second year of production and was first fertilized in 1972 with 6-24-24 at the rate of 200 pounds per acre (224 kg/ha).

Site 810 (V5C) was located on the drainage ditch 1 mile (1.6 km) below site 801. The water at site 810 was a mixture of paddy seepage, stream water which flowed through a paddy, bog seepage, and paddy overflow. The major influence on discharge in the ditch was bog soil since less than 20 acres (8 ha) of the 160 - 190-acre (64-77 ha) development was on mineral soil.

Site 900 was located on the Tamarac River near the bridge on Minnesota State Highway 72 in the village of Waskish. It was estimated that the Tamarac River received the effluent from approximately 1,500 acres (600 ha) of rice paddies.

PROJECT OBJECTIVE

The main objective of this project is to provide information, based upon valid scientific data, that will assist the development of the wild rice industry in such a manner as to minimize harmful ecological effects. Changes in the quality of water discharged from the wild rice impoundments will be studied and recommendations will be made on methods of farming and water discharge that will minimize potential problems.

SECTION IV

METHODS

CHEMICAL AND PHYSICAL DETERMINATIONS OF WATER QUALITY

Field collections started with spring break-up in mid-April on the rivers and discharge ditches which carried water to and from the commercial developments. As selected paddies were flooded, usually before the end of May, they were added as sampling sites. At each of these sites, samples were taken on a weekly basis. In late summer, during the period of paddy draindown, sampling was increased; and major sites, such as the discharge ditches and the Clearwater River, were monitored daily. Two 1-liter samples were collected in Plastic Cubitainers* at each site; one was preserved with 5 milliliters of chloroform and the other with 40 milligrams of mercuric chloride. Dissolved oxygen and temperature measurements were made in the field with a Model 54 Yellow Springs Instrument. Alkalinity and pH measurements were made with a Beckman Electroscan 30 immediately upon return to the laboratory. Alkalinity measurements were not taken if the sample was more than 24 hours old.[7] At the same time turbidometric determinations were made with a Hach Model 2100 A turbidimeter.[7] The determination of total Kjeldahl nitrogen employed the micro-colormetric procedures with Nesslerization as outlined by the EPA Methods For Chemical Analysis of Water and Wastes, while ammoniacal

*Trade name

nitrogen was determined by Nesslerization of a distillate as recommended in Standard Methods for the Examination of Water and Waste Water, 13 ed. Calcium and magnesium were analyzed by means of atomic absorption in accordance with EPA methods; with flame emission being used for potassium. Filterable and dissolved solids were determined by EPA methods, while the phenoldisulfonic acid method outlined in Standard Methods for the Examination of Water and Waste Water, 13 ed., was used for nitrate determinations.

Soluble phosphorus was determined by using the single reagent method as recommended by the EPA. The samples were unfiltered and 20 milliliters of isobutanol was used to concentrate the complex. The accuracy of the soluble phosphorus concentrations is doubtful because of interferences observed in the determinations. The procedure employed for the total phosphorus analysis followed the EPA methodology with the exception that the samples were not neutralized since their pH was consistently between pH 7 and 8 and potassium persulfate was used in lieu of ammonium persulfate. The phosphomolybdate complex was extracted with isobutanol to increase sensitivity.

QUALITY CONTROL

Precision and accuracy checks were made on the analyses for total phosphorus, total Kjeldahl-nitrogen, and ammonia-nitrogen using reference samples supplied by the Environmental Protection Agency, Analytical Quality Control Laboratory. The results obtained by our laboratory are compared with the known concentrations in Table 1.

Table 1. ANALYTICAL QUALITY CONTROL SAMPLES

Parameter	Known Concentration	Concentration Reported
Total P	.17	.18 ± .003
NH_3-N	1.70	1.65 ± .11
TKN	1.70	1.65 ± .11

Internal precision was maintained by replicate analyses of sample aliquots performed routinely. Accuracy determinations employed spiking techniques to determine recovery percentages.

STREAM FLOW

Measurement of water volumes in the seepage and discharge ditches were made by monitoring the flow over a 90-degree v-notch weir with a Stevens Type F water level recorder. Cross sections of the Clearwater River were made at three sites with the aid of surveying instruments. Stream velocities were estimated by timing a float over a measured section of the river. These measurements were used to determine water budgets for the paddies and nutrient loading rates.

ALGAL ASSAY

Selenastrum capricornutum, supplied by National Eutrophication Laboratory, was used as the algal assay test organism. The tests and replicates were conducted in compliance with the Algal Assay Bottle Test as developed by the National Eutrophication Research Program.[9] Measurements of standing crops of algae were made by direct counting with a Levy Heamocytometer and microscope during 1972. Measurements made during 1973 employed an Electro Zone Cello-scope particle counter.

SOIL CHEMISTRY

All soil analyses were carried out at field moisture conditions except pH, total phosphate, and textural analysis. The soil pH was determined at the moisture saturation point with a glass electrode and calomel reference electrode. Total phosphate was analyzed according to the acid-free vanadate-molybdate method of Tandon et al.[10] Textural analysis of the mineral soil was carried out according to the hydrometer method outlined by Shirlaw,[11] and the semimicro technique of Jackson was used to determine the cation exchange capacities.[12] Available phosphate concentrations were determined by the extraction method suggested by Truog.[13] Color was developed in the filtered extract by the sulfomolybdate acid method of Jackson.[12] Inorganic phosphate was fractionated according to the method of Chang and Jackson,[14] while the analytical procedures for the iron, aluminum, and calcium phosphates were those suggested by Jackson.[12]

SECTION V

RESULTS

INTRODUCTION

The results have been divided into ten sections which summarize selected data from various phases of this project. A detailed summary of the chemical analyses from all sampling sites is reported in tabular form in the appendix of this paper. Those tables separately summarize data from the summer growing season and the fall discharge period.

The concentrations of the chemical parameters are reported as milligrams per liter (mg/l), while turbidity measurements are reported as Formazin Turbidity Units, (FTU). Where applicable, confidence limits (C.L.) at the ninety-five percent (95%) certainty level for the mean are reported. Because of a limited number of observations (N) at some sites the confidence limits of the mean were calculated by multiplying a tabled "t" value times the standard error of the mean. The values reported are the mean ($\bar{x}$) plus and minus ($\pm$) the standard error of the mean ($\sqrt{\text{variance}/N}$) times t (.05).[15]

PHOSPHORUS

Soluble and total phosphorus concentrations were determined at all sites in the study area. Analytical problems with soluble phosphorus

were detected when some values exceeded total phosphorus concentrations. The major problems were found in a fertilized organic soil paddy, site 125 and a drainage ditch, site 160, carrying seepage water from fertilized organic soil paddies. At these sites soluble phosphorus concentrations were usually greater than total phosphorus concentrations. Though both soluble and total phosphorus values are reported and discussed the soluble values exhibited greater uncertainty in some cases.

All phosphorus values are reported as mg/l phosphorus (P). Site 100, on the Clearwater River above the fertilized rice paddies, exhibited little variation in the soluble phosphorus concentrations throughout the growing seasons of 1971, 1972, and 1973. The mean soluble phosphorus concentration was 0.060 $\pm$ .065 mg/l while total phosphorus concentrations ranged from a minimum of .019 to .270 mg/l with a mean of .094 $\pm$ .014 mg/l. Summer data collected at site 300, on the Clearwater River located 4 miles (6.4 km) below 2,000 acres (810 ha) of Clearwater Rice and associated paddies indicated that the mean phosphorus levels were slightly higher in this portion of the stream with .031 mg/l soluble phosphorus and .098 mg/l total phosphorus. Limited midsummer data from additional downstream sites indicated a leveling in the summer phosphorus levels. The mean soluble phosphorus concentration at site 500 located immediately below the Ki-Wo-Say paddy discharge was .015 $\pm$ .010 mg/l while the total phosphorus concentration was .122 $\pm$ .059 mg/l. The July concentrations were slightly greater at site 600, located below about 4,000 acres (1,600 ha) of rice cultivation. The July concentrations at site 600 were .064 $\pm$ .048 mg/l soluble phosphorus and .140 $\pm$ .093 mg/l total phosphorus Table 2 summarizes the phosphorus data for the Clearwater River.

Table 2. MEAN SUMMER CONCENTRATIONS OF SOLUBLE AND TOTAL PHOSPHORUS ON THE CLEARWATER RIVER (mg/l ± 95% C.L.)

Site	Mean Soluble Phosphorus	N	Mean Total Phosphorus	N
100	.060 ± .065	50	.094 ± .014	49
300	.031 ± .009	38	.098 ± .016	40
500	.015 ± .010	6	.122 ± .059	6
600	.064 ± .048	3	.140 ± .093	4

During the summer months there was no active discharge from the rice paddies. A number of small streams and ditches contained drainage and seepage water from rice paddies that entered the Clearwater River.

One such source was a 2,200 foot (670 m) ditch, site 160, bordered on each side by rice paddies. The water in this ditch was primarily seepage water from the paddies and a small amount of bog drainage. During the summers of 1971, 1972, and 1973 the soluble phosphorus concentrations fluctuated between .005 and .629 mg/l with a mean value of .113 ± .127 for the three seasons. Analytical problems with soluble phosphorus raised some questions about its significance at high concentrations. The mean total phosphorus concentrations .248 ± .096 mg/l were slightly higher for the three summers. Concentrations of .095 ± .041 mg/l soluble phosphorus and .122 ± .021 mg/l total phosphorus, were observed in the discharge ditch near the Ki-Wo-Say Wildlife Area. This 1,200 foot (365 m) ditch, site 410, had paddies on both sides for the entire length and was sampled periodically prior to discharge from 1970 through 1973. These data are summarized in Table 3.

Table 3. MEAN SUMMER CONCENTRATIONS OF SOLUBLE AND TOTAL PHOSPHORUS ON TWO DRAINAGE DITCHES ENTERING THE CLEARWATER RIVER (mg/l ± 95% C.L.)

Site	Mean Soluble P	N	Mean Total P	N
160	.195 ± .089	42	.248 ± .096	41
410	.095 ± .041	47	.122 ± .021	47

The rice paddies in the Clearwater River area were generally discharged during the first week of August. This marked the second portion of the sampling season when increased sampling occurred. The Clearwater River was monitored during the discharge periods of 1971, 1972, and 1973. At site 100, above the rice paddies, the mean soluble phosphorus and total phosphorus concentrations remained low at .039 and .084 mg/l, respectively. During the discharge periods, at site 300, a noticeable increase was observed in the concentrations of soluble and total phosphorus. Limited data from the downstream sites, 500 and 600 also showed increases, which appeared to correlate with the increased acreages of rice. Table 4 summarizes the phosphorus concentrations observed in the Clearwater River during discharge for the years 1971, 1972, and 1973. The majority of all the samples were taken during 1973. Paddy effluents were discharged into drainage ditches during the fall drawdown. Sites 160 and 410 were monitored during this period as well as two additional paddy outlets, sites 140 and 220. Site 140 received water from approximately 400 acres (160 ha) of fertilized rice paddies while site 160 received the discharge from 80 acres (32 ha). Site 220 drained a portion of a new development of approximately 1,400 acres (570 ha) of fertilized rice paddies. Site 410 drained 100 acres (40 ha) of unfertilized rice paddies below the

Ki-Wo-Say Wildlife Area owned by the Red Lake Band of Chippewa Indians.

Table 4. THE MEAN CONCENTRATIONS OF PHOSPHORUS OBSERVED IN THE CLEARWATER RIVER DURING DISCHARGE (mg/l ± 95% C.L.)

Site	Mean Soluble P	N	Mean Total P	N
100	.039 ± .020	17	.084 ± 018	17
300	.170 ± .055	21	.339 ± .095	21
500	.139 ± .343	3	.253 ± .418	3
600	.337 ± .064	17	.442 ± .111	17

When compared with site 100, the increased levels of soluble phosphorus observed at sites 140 and 220 were statistically significant. The same degree of significance can be attributed to the greater levels of total phosphorus at sites 140, 160, and 220. At site 410, the small increase in total phosphorus above the Wildlife Area, site 400, was not statistically significant.

Table 5. MEAN PHOSPHORUS CONCENTRATIONS IN RICE PADDY EFFLUENTS (mg/l ± 95% C.L.)

Site	Mean Soluble P	N	Mean Total P	N
140	.328 ± .081	14	.353 ± .100	14
160	.118 ± .078	17	.320 ± .081	16
220[a]	.975 ± .440	7	.987 ± .322	8
410	.105 ± .134	19	.104 ± .045	19

[a]drains paddies in the first year of production.

Data presented in Tables 5 and 6 indicate the mean phosphorus concentrations observed in the paddy effluents approximate the

concentrations observed in the paddies just prior to discharge, except for soluble phosphorus at the Ki-Wo-Say, site 405. Increases in phosphorus concentrations in the discharge to levels above that observed in the paddy water appeared to correlate with increases in suspended solids and turbidity.

Table 6. PHOSPHORUS CONCENTRATIONS OBSERVED IN RICE PADDIES IN THE CLEARWATER RIVER DRAINAGE BASIN PRIOR TO DISCHARGE (mg/l)

Site	Soluble P	Total P	
105	.190	.200	20 July 73
115	.184	.275	26 July 73
125	2.180	1.450	28 July 71
125	.370	.460	26 July 72
125	.050	.113	26 July 73
145	.140	.300	26 July 73
155	.182	.280	9 Aug. 72
155	.074	.240	2 Aug. 73
215[a]	.790	1.60	9 Aug. 73
405	.054	----	28 July 71
405	.016	.075	2 Aug. 72
405	.028	.117	26 July 73

[a]A paddy in the first year of production.

The phosphorus concentrations observed in the Battle River, west of Kelliher, were higher than those observed in the Clearwater River Basin. Samples collected from the Battle River, site 700, during the summer growing season exhibited little variation in soluble phosphorus ranging from 0.019 to .052 mg/l with a mean value of .034 mg/l. The total phosphorus values observed during the summer of 1973 were slightly more ranging about the mean of .126 mg/l from 0.75 to .25 mg/l. The concentrations of both soluble and total phosphorus increased during the August discharge period to .071 and .168 mg/l, respectively.

Phosphorus concentrations observed at site 710, the ditch draining 120 acres (48 ha) of new mineral paddies, were lower than levels observed in the Battle River throughout the discharge period. These comparisons are depicted in Table 7.

Table 7. PHOSPHORUS CONCENTRATIONS ASSOCIATED WITH RICE PADDIES ON MINERAL SOIL. (mg/l ± 95% C.L.)

Site	Mean Soluble P	N	Mean Total P	N	
700	0.034 ± .008	11	0.126 ± .034	11	summer
700 A	.071 ± .009	3	.168 ± .054	15	fall
710	0.015 ± .008	14	0.116 ± .032	13	fall

The third study area located near Waskisn consisted of a series of paddies where the soil was a very thin layer of peat over a mineral soil. The water used to fill the paddies was diverted from ditches draining a large peat bog. The major source of water, site 801, was sampled above the rice paddies during the growing season and the discharge period. The mean soluble phosphorus was .032 mg/l for the summer months increasing to .059 mg/l for the fall. The total phosphorus concentration rose slightly from .103 to .110 mg/l. Site 810, located about one mile downstream from site 801, contained, in addition to bog drainage, seepage from approximately 190 acres (77 ha) of paddies. During the discharge period, the effluent from the paddies was monitored at site 810. During the summer there was a significant contribution of both soluble and total phosphorus to the ditch via the paddy seepage with the mean values being .128 and .184 mg/l for the soluble and total concentrations. However, the amount of phosphorus

added to the stream by the discharge from the paddies did not significantly increase the downstream concentrations in the discharge ditch.

Table 8. MEAN PHOSPHORUS CONCENTRATIONS IN THE RED LAKE WATERSHED AT WASKISH, MINNESOTA (mg/l ± 95% C.L.)

Site	Mean Soluble P	N	Mean Total P	N	
801	.032 ± .009	30	.103 ± .022	30	summer
801	.059 ± .064	10	.110 ± .103	9	fall
805	.138 ± .124	32	.153 ± .057	30	paddy
810	.128 ± .046	35	.184 ± .039	35	summer
810	.069 ± .029	15	.175 ± .078	15	fall
900	.046 ± .025	5	.070 ± .049	5	summer
900	.068 ± .017	19	.097 ± .039	19	fall

From the data in table 8, it appears that the discharge of rice paddies into the Tamarac River, site 900, did not significantly alter the baseline phosphorus values. It was estimated that the Tamarac River received the discharge from 1,500 acres (600 ha) of ricelands.

NITROGEN DYNAMICS

Two forms of nitrogen were monitored throughout the course of this study, ammonia-nitrogen and total Kjeldahl-nitrogen. Nitrate-nitrogen determinations were made at most sites during 1971 and 1972, but were discontinued in 1973 as they had appeared rather constant. Nitrate-nitrogen values are recorded in the appendix.

The ammonia-nitrogen levels in the waters flooding fertilized rice paddies on the peat soils in Clearwater County generally remained

less than 1 mg/l over the three growing seasons. During periods of radical soil disturbance, associated with thinning operations in late May and early June, and with the aerial application of nitrogen fertilizers in July, ammonia-nitrogen levels exceeded 1 mg/l but rapidly returned to baseline levels. The total Kjeldahl-nitrogen levels in the same paddies were more variable. The mean annual concentrations ranged from 1.5 to 4 mg/l. Fluctuation in Kjeldahl-nit rogen closely followed changes in ammonical-nitrogen values and were highest during the thinning periods. Table 9 summarizes the mean concentrations of both ammonia-nitrogen and total Kjeldahl-nitrogen in the paddies.

Table 9. MEAN CONCENTRATIONS OF AMMONIA-NITROGEN AND KJELDAHL-NITROGEN IN FERTILIZED PEAT PADDIES ALONG THE CLEARWATER RIVER (mg/l ± 95% C.L.)

Site	Mean NH_3-N	N	Mean TKN-N	N
105	.266 ± .203	11	2.196 ± .466	11
115	.616 ± .677	17	1.924 ± .209	17
125	.538 ± .162	52	1.707 ± .186	52
145	.216 ± .114	15	1.952 ± .499	18
155	.306 ± .155	17	2.604 ± .935	18
215[a]	.402 ± .222	9	4.427 ± 1.031	9

[a] A paddy in the first year of production.

Site 405 is a paddy on the Ki-Wo-Say development which only received one application of ammonium-nitrate fertilizer in 1972. Data from this site shows that the ammonia-nitrogen levels were not significantly different from the concentrations observed on the fertilized paddies, but the Kjeldahl-nitrogen level was lower. The mean ammonical-nitrogen concentration for the study period in the Ki-Wo-Say paddy

was .521 ± .136 mg/l, while the total Kjeldahl-nitrogen level was 1.667 ± .165 mg/l.

Throughout the growing season from April to the end of July the seepage from the paddies collected at sites 160 and 410 contained as much or more ammonia and less Kjeldahl-nitrogen than the adjacent paddies. At site 160 the mean ammonia-nitrogen concentration for the summer months was .428 ± .117 mg/l and the Kjeldahl-nitrogen level was 1.149 ± .140 mg/l. At the Ki-Wo-Say paddy, site 405, the ammonia-nitrogen concentration for the summer months averaged .521 ± .136 mg/l compared to .578 ± .108 mg/l for the adjacent ditch, site 410. The Kjeldahl-nitrogen values for the paddy and the ditch were less divergent, 1.667 ± .165 and 1.647 ± .143 mg/l, respectively.

The nitrogen levels observed in the paddy effluents during discharge closely approximated the levels observed in the paddies during the summer months. A summary of nitrogen levels observed during drawdown is found in Table 10.

Table 10. MEAN NITROGEN CONCENTRATIONS IN PADDY EFFLUENTS (mg/l ± 95% C.L.)

Site	Mean Ammonia Nitrogen	N	Mean Kjeldahl Nitrogen	N
140	.141 ± .098	13	1.497 ± .220	13
160	.335 ± .196	16	1.541 ± .267	16
210[a]	.444 ± .119	16	3.371 ± .537	16
220[a]	.598 ± .675	10	4.102 ± .522	10
410	.455 ± .152	21	1.639 ± .282	21

[a] Draining first year paddies.

The rice paddy effluents did not appear to significantly effect the ammonical-nitrogen concentrations in the Clearwater River during the discharge period. Increases in the Kjeldahl-nitrogen levels over the summer baseline levels, however, were observed at all stations except at site 100 which is above the rice paddies. These changes are evident from the data in Table 11.

Table 11. COMPARISONS OF SUMMER AND FALL NITROGEN CONCENTRATIONS IN THE CLEARWATER RIVER (mg/l ± 95% C.L.)

	Site	Mean NH_3-N	N	Mean Kjeldahl	N
summer	100	.184 ± .046	46	.665 ± .086	47
fall	100	.267 ± .104	16	.608 ± .144	14
summer	300	.264 ± .082	35	.774 ± .125	40
fall	300	.269 ± .089	24	1.341 ± .245	24
summer	500	.090 ± .130	6	.605 ± .133	6
fall	500	.283 ± .404	3	1.647 ± 1.311	3
summer	600	.274 ± .354	4	1.080 ± .216	4
fall	600	.321 ± .093	17	2.296 ± .315	17

The nitrogen dynamics associated with mineral paddies near Kelliher, Minnesota, were similar to that observed in the Clearwater Basin. The mean ammoniacal-nitrogen level increased slightly from the summer value of .124 ± .094 to .138 ± .078 mg/l in the Battle River, site 700-A, which was the receiving stream for the rice paddies. One of the mineral paddies, site 705, averaged .174 ± .107 mg/l ammonia for the summer. A significant increase from .644 ± .157 to 1.544 ± .233 mg/l Kjeldahl-nitrogen occurred during the discharge period. The effluent from the mineral paddy averaged 1.311 ± .184 mg/l Kjeldahl-nitrogen at site 710.

Nitrogen levels in the bog drainage ditches which supply water to the paddies in the Waskish area were higher than the concentrations seen in the Clearwater Basin. The mean summer concentrations in the supply ditches of ammonia-nitrogen and total Kjeldahl-nitrogen for site 801 were .554 ± .181 and 1.66 ± .226 mg/l, respectively. During August, the concentrations of both ammonia and Kjeldahl-nitrogen increased in the supply ditch, site 801, to .741 ± .400 and 2.072 ± .455 mg/l respectively. In this area the higher nitrogen levels at site 805 in the paddy did not appear to influence the concentrations of nitrogen at site 810 in the discharge ditch or at site 900 in the Tamarac River which is in the receiving stream. These data are summarized in Table 12.

Table 12. MEAN NITROGEN CONCENTRATIONS AT SITES IN THE WASKISH AREA (mg/l ± 95% C.L.)

	Site	Mean NH_3-N	N	Mean Kjeldahl-N	N
summer	801	.554 ± .181	31	1.662 ± .226	31
fall	801	.741 ± .400	10	2.072 ± .455	9
paddy	805	.595 ± .167	27	2.188 ± .177	32
summer	810	.552 ± .166	31	1.940 ± .294	33
fall	810	.662 ± .415	13	2.111 ± .297	12
summer	900	.299 ± .229	5	1.556 ± .402	5
fall	900	.148 ± .069	19	1.627 ± .169	19

PH, ALKALINITY, HARDNESS AND METAL IONS

pH Levels

The pH values observed in the Clearwater River and associated paddies were remarkably similar and fairly constant throughout the summer. The Clearwater River was slightly basic averaging 8.1 ± .1 pH units

for all river stations for the study period. The pH observed in the paddies was slightly less, averaging 8.0 ± .1, while the paddy effluents ranged between 7.0 and 8.2 pH units. No major variations in pH were noted during the study and the slight variation appeared to coincide with changes in precipitation.

Limited data from the mineral paddies in the Kelliher area indicated that similar general conditions prevailed. In the Waskish complex, slightly lower pH values were observed at all stations. The mean pH values for the inlet, site 801; the paddy, site 805; and the outflow, site 810 were 7.6, 7.7, and 7.5, respectively.

Alkalinity and Hardness

The alkalinity and hardness in the Clearwater River Basin did not appear to be adversely affected by the discharge from the rice paddies during the study period. There was an increase in both the alkalinity and hardness at the site below the rice paddies during the fall discharge. However, the mean alkalinity during the fall was less than that observed during the summer months.

It was expected that there would be a significant increase in both alkalinity and hardness in the river, since the levels found in the paddies and their discharge ditches were significantly higher in most instances ranging from 250 to 325 mg/l for both parameters. The exception was the Ki-Wo-Say Wildlife Area and paddy complex where the alkalinity and hardness were low relative to the Clearwater River. The seepage and effluent from the Ki-Wo-Say paddies exhibited higher mean alkalinity and hardness than the river as shown in Table 13.

Table 13. MEAN SEASONAL ALKALINITY AND HARDNESS LEVELS IN THE CLEARWATER RIVER BASIN (mg/l ± 95% C.L.)

Site	Season	Mean Alkalinity	Mean Hardness
100-101	summer	228 ± 6	217 ± 9
	fall	207 ± 9	193 ± 9
125	summer	260 ± 20	251 ± 16
160	summer	274 ± 9	253 ± 11
	fall	303 ± 63	274 ± 22
215[a]	summer	321 ± 27	313 ± 44
300	summer	215 ± 10	211 ± 8
	fall	215 ± 27	232 ± 11
400	summer	162 ± 11	157 ± 9
	fall	158 ± 16	168 ± 9
405	summer	182 ± 17	199 ± 21
410	summer	276 ± 24	299 ± 33
	fall	250 ± 43	257 ± 45

[a] First-year paddy.

Due to the necessity of storing samples from the Kelliher area for one to three days before analysis, little can be discussed about the alkalinity of the Battle River or adjacent paddies. The limited hardness data for the area point to a moderate increase in hardness in the river as a result of paddy discharges.

The summer alkalinity in the paddy in the Waskish complex, site 805, decreased with respect to the inlet ditch, site 801, while the average value for the same period in the discharge ditch, site 810, approximated the inlet concentration. The mean alkalinities for the inlet, paddy and the outflow were 214, 186, and 216 mg/l, respectively. A similar trend was observed with respect to mean hardness with inlet, paddy, and outflow concentrations of 216, 205, and 216 mg/l.

Calcium

The mean calcium levels in the Clearwater River increased moderately from 42 mg/l at site 100, located above the rice paddies, to 56 mg/l at site 600, below 4,000 acres (1,600 ha), during the fall discharge. The effluent from the paddies reflected the concentrations observed in the paddies themselves with levels ranging from 65-75 mg/l in the fertilized paddies to about 50-55 mg/l for the unfertilized paddies.

The calcium levels in the discharge fror the mineral paddies at Kelliher averaged 55 mg/l (site 710) while the summer mean for the Battle River (site 700) was 52 mg/l.

There was no significant change in the calcium ion concentrations at the Waskish paddy sites (801, 805, and 810) throughout the season. Refer to the appendix for mean values by site for calcium.

Magnesium

Magnesium concentrations in the Clearwater River increased downstream through the rice growing region with summer mean concentrations increasing from 23 mg/l at site 100 above the rice paddies to 31 mg/l at site 600, located below 4,000 acres (1,600 ha) of rice.

During the discharge period, increases of from 3 to 5 mg/l were observed at the downstream sites. The inlet water for the Ki-Wo-Say paddies site 400, and the paddies sampled, site 405, exhibited magnesium concentrations in the range of 15-16 mg/l for the summer months. The discharge and seepage from the paddies showed respective increases to 24 and 28 mg/l. Magnesium ion concentrations at the Waskish sites 801, 805, and 810 averaged 19 mg/l for the summer months. A slight

increase to 21 mg/l occurred during the fall at site 801 in the inlet ditch and site 805 in the paddy. However, a decrease to 17 mg/l was recorded at site 810 in the discharge ditch. Refer to the appendix for mean value data.

Potassium

Potassium levels varied from 2 to 5 mg/l in the Clearwater River basin for the season. The concentrations in the river were high during the spring, decreased during the summer, and increased to higher levels in the fall. Two to threefold increases in potassium ion concentrations were observed in fertilized paddies when they were flooded or radically disturbed during thinning operations. These levels decreased to river levels throughout the summer.

Though variable, the average potassium ion concentrations in the Ki-Wo-Say area were less than those observed in the Clearwater River.

In the mineral paddy at Waskish, the concentration of potassium vacillated from .5 to 4 mg/l for the study period rising to 6.5 mg/l during thinning operations. The concentration in the discharge ditch, though slightly higher on occasion, was not significantly different than the inlet water. Mean values by site are reported in the appendix.

DISSOLVED, FILTERABLE AND VOLATILE SOLIDS

Dissolved Solids

The dissolved solids in the Clearwater River above the paddies, site 100, though varying from about 150 to 290 mg/l during the three summers, averaged 245 $\pm$ 10 mg/l. During the discharge period, site

300, below 2,000 acres (810 ha) averaged 298 ± 19 mg/l while the mean value for site 600, located below 4,000 acres (1,600 ha), was 403 ± 39 mg/l. The fall mean represented an increase of about 50 mg/l over the summer mean for sites 300 and 600. The mean dissolved solids discharged from the older organic paddies, sites 140 and 160, was 330 mg/l. A much greater contribution was made by the first year paddies where the mean values observed in the discharge ditches, sites 210 and 220, exceeded 470 mg/l.

The dissolved solids were rather low in the Ki-Wo-Say marsh and paddies averaging 198 and 243 mg/l, respectively, for sites 400 and 405, but the leachate from the paddies averaged nearly twice the amount found in the paddy. The dissolved solids were significantly reduced in the combined seepage-drainage ditch (site 410) with the discharge of the paddy. A similar trend was observed in the Battle River which received the effluent from the mineral paddies near Kelliher.

At the Waskish paddy (805) the mean concentration of dissolved solids of 202 mg/l was significantly less than that observed in the inlet water (site 801) or the discharge (site 810) which had mean levels of 311 and 325 mg/l, respectively.

Filterable Solids

Due to the consistency of flooded peat soils, great fluctuations in filterable solids were observed in the rice paddies. Levels of 300 to 400 mg/l were recorded during thinning operations, but these rapidly decreased to mean levels of 20 to 30 mg/l for most of the growing season. During discharge, paddy effluents varied from 16 to 87 mg/l filterable solids with the higher concentrations in the discharges from the first-year paddies.

The greatest change in mean filterable solids that occurred in the Clearwater River was observed at site 300. Here the fall levels increased significantly from the mean summer value of 13.6 ± 3.8 to 35.5 ± 13.3 mg/l. An increase from a July average of 9 to 22 mg/l was observed at site 600 during the same time period.

At the Waskish sites, during discharge, there was a decrease in filterable solids from 17 mg/l in the inlet stream, site 801, to 11 mg/l at the discharge site 810. The Tamarac River, the receiving stream for these effluents, averaged less filterable solids during the discharge period than during the summer months, 6 vs 12 mg/l.

Volatile Solids

The volatile solids in the Clearwater River comprised a rather constant 40 percent of the total dissolved solids, rising and falling with the dissolved solids. Increases in mean volatile solids from less than 100 mg/l above the paddies (site 100) to 135 mg/l (site 300) and 193 mg/l (site 600) were observed during the fall draindown. The mean volatile solids discharged from older paddies at the Clearwater Rice development averaged 172 mg/l at site 140, and 158 mg/l at site 160. The discharge from the first year paddies flowing past sites 210 and 220 maintained mean levels of volatile solids of 227 and 215 mg/l, respectively.

The mean concentration of volatile solids, during discharge, from the Ki-Wo-Say paddies was 18 mg/l less than the mean level of 159 mg/l recorded in the same ditch during the summer months.

Limited data from the Kelliher area indicated little change in volatile solids concentrations occurred in the Battle River as a result of rice paddy discharges. A slight decrease from the summer mean was noted in the fall.

With the exception of occasional pulses, no significant changes in mean volatile solids were observed at Waskish between the inlet water at site 801 and the discharge ditch, site 810, either during the growing season or the fall draindown. The concentration of volatile solids in the Tamarac River remained a rather constant 100 mg/l for the study period.

PHYSICAL FACTORS - TURBIDITY, TEMPERATURE AND DISSOLVED OXYGEN

Turbidity

The Clearwater River is aptly named because the turbidity above the paddies at sampling site 100, averaged about 3 FTU for the study period. The turbidities below the rice paddies in the channelized portion of the river averaged 6 FTU at site 300 and 9 FTU at site 600. It is difficult to determine if the moderate increases in turbidity recorded during the fall were a result of paddy discharges or of the 3.3 inches (8.3 cm) of rain which fell during the discharge period in 1972 or the 2.4 inches (6.0 cm) that fell during the same period in 1973. With the exception of marked increases associated with flooding and thinning, the turbidities observed on both the fertilized and unfertilized peat paddies were generally less than the inlet waters. The turbidities of the major discharge and seepage ditches remained near the levels recorded in the receiving streams in the summer; but, during the discharge period, levels in excess of 50 FTU were recorded.

Turbidities of the inlet water for mineral paddies at Waskish (site 804) exceeded 20 FTU in the early spring but decreased to about 1.5 FTU for the summer months. The turbidity of the paddy studied, site 805, was generally less than that observed in the inlet ditch. During the final stages of discharge, turbidity levels in excess of 20 FTU were observed but they quickly returned to normal as flows decreased.

Temperature

The temperatures observed in the rice paddies, discharge ditches, and receiving streams varied on a diurnal basis. On the average the temperature of the paddy and discharge water was generally 1 to 4°C less than the receiving streams in the early morning; increasing to a maximum of 1 to 2°C above the temperature of the receiving stream during afternoon samplings. For the period of maximum discharge no fluctuations in river temperature were noted.

Dissolved Oxygen

The Clearwater River was consistently supersaturated with dissolved oxygen and no diurnal variation was noted. The water in the rice paddies had lower dissolved oxygen tensions ranging from less than 1 mg/l to saturation. These variations resulted from plant photosynthesis, respiration and wind generated aeration. The upper portion of paddy had consistently higher dissolved oxygen readings than the water just above soil surfaces in peat paddies. The discharges from these paddies did not appear to affect the oxygen tensions in the receiving streams as they were well aerated by the time they reached the stream. Similar observations were recorded in the other study areas.

ALGAL ASSAYS

Algal assays were conducted on a preliminary basis at selected sites along the Clearwater River in 1972.[16] The study was expanded in 1973 to include additional sites. All values are reported as means with plus or minus 2 standard deviations. Results shown in figure 2, indicate that the maximum standing crop of the test organism, Selenastrum capricornutum remained rather constant at sites 100 and 300 until late June of 1972.

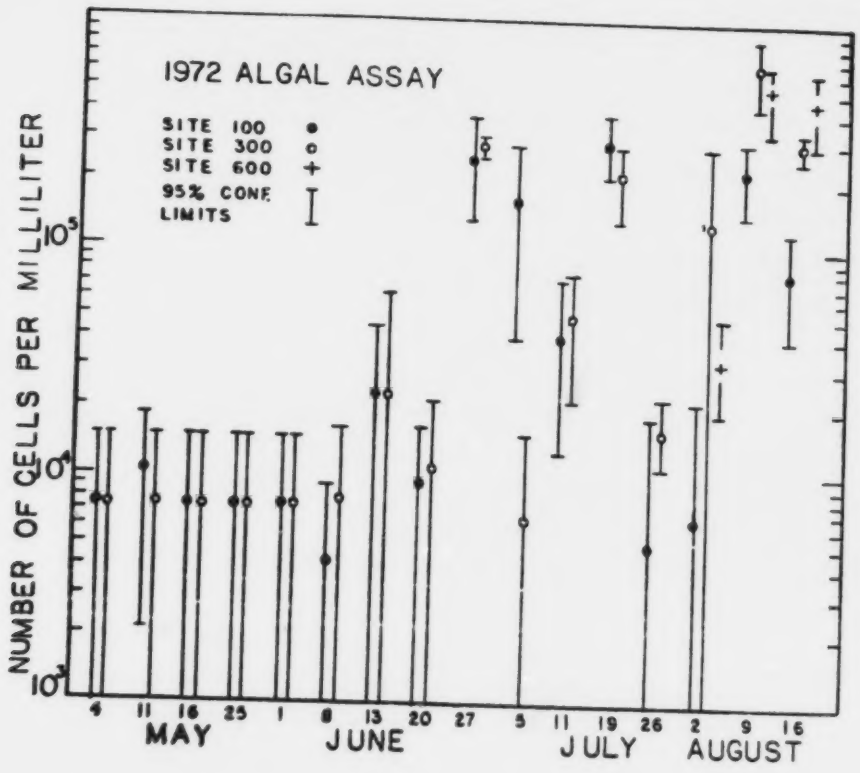

Figure 2. Standing crops of algae produced in Clearwater River water in 1972

The increased productivity recorded prior to the beginning of paddy discharges, which began on August 2, appeared to be induced by the heavy rains recorded during the same period, figure 3.

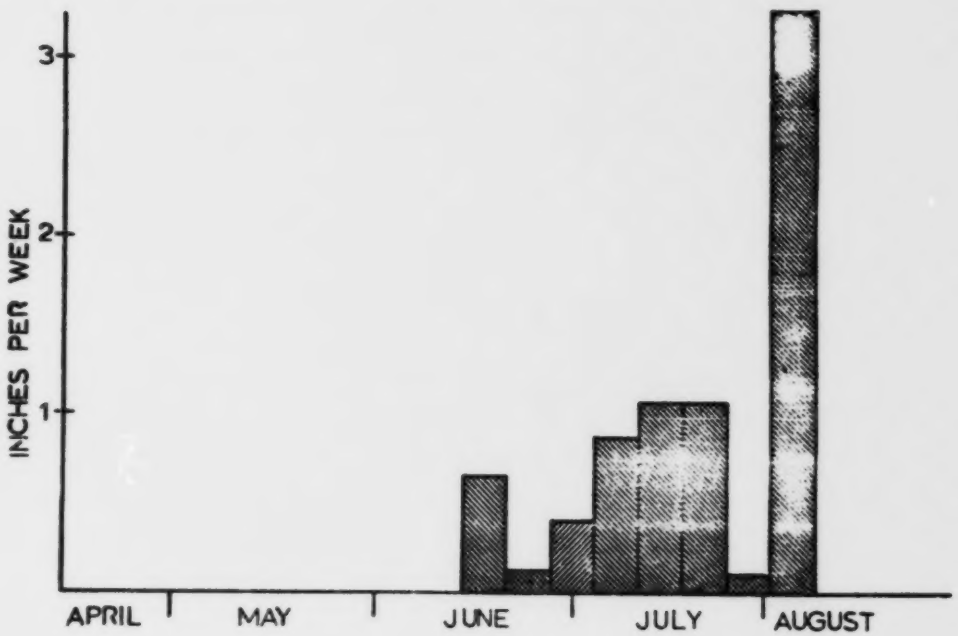

Figure 3. Weekly precipitation recorded at the Ki-Wo-Say paddies on the Clearwater River (1972).

Though significant increases above the potential productivity of site 100 occurred during the discharge period at sites 300 and 600 in early August of 1972, the run-off from the 3.3 inches (8.4 cm) of rain which fell during this period undoubtedly influenced the results. Figure

4, summarizing the results of the 1973 assays conducted on the Clearwater River water, shows that at site 600 the potential productivity remains quite constant throughout the summer and fall, uninfluenced by either heavy rains or paddy discharge. It appeared that during the latter stages of paddy discharge, after August 8, the increased nutrients from paddy effluents may have been responsible for the

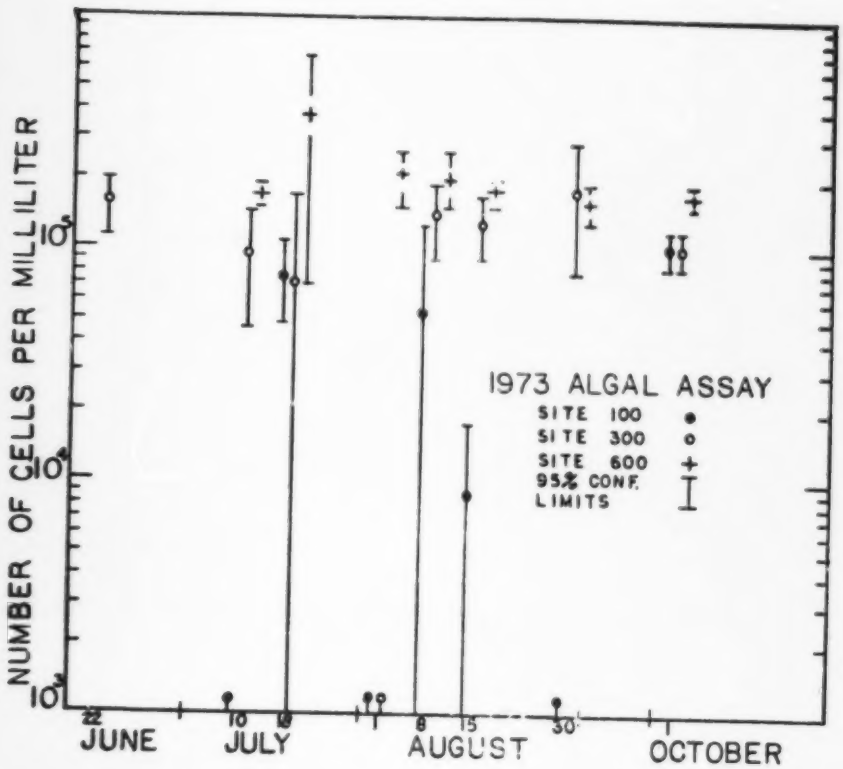

Figure 4. Standing crops of algae produced in Clearwater River water in 1973.

increases observed in the standing crop of algae produced by the samples from site 300 compared to site 100 located above the paddies.

The maximum standing crop of the test organism, produced in water from site 600, was less than 20 percent of the crop produced in the synthetic algal media indicating some form of nutrient limitation, 5.4×10^5 cells/ml vs 6.3×10^6 for 1972 and 3.7×10^5 vs 1.8×10^6 for 1973. Preliminary investigation led to the conclusion that the river at site 100 was phosphorus limiting during the early summer but subsequent data summarized in Table 14 indicates that nitrogen was limiting at all sites in both the Clearwater River and the paddy discharges when drawdown occurred.

Table 14. MAXIMUM STANDING CROPS OBTAINED AT SELECTED SITES WITH THE SAMPLE COLLECTED 8 AUGUST 1973 AND WITH SPIKES OF PHOSPHORUS AND NITROGEN. ALL VALUES TIMES 10^5 cells/ml.

Site	Sample	Plus .125 mg/l P	Plus .5 mg/l N
300	1.41 ± 0.53	1.27 ± 0.35	3.28 ± 1.49
600	2.03 ± 0.56	1.92 ± 1.34	4.38 ± 2.07
160	1.49 ± 1.00	1.15 ± 0.61	4.45 ± 0.29
140	1.19 ± 0.31	.90 ± 0.46	4.50 ± 1.71

Limited data from the Battle River, site 700, near Kelliher indicated a considerable amount of variation in maximum standing crops. From data shown in Table 15, it is evident that the paddy assayed, site 705, was limited early in the season but potential productivity increased significantly to levels higher than the river prior to discharge.

Table 15. MAXIMUM STANDING CROPS OF ALGAE PRODUCED AT SITES 700 AND 705 NEAR KELLIHER, MINNESOTA. ALL VALUES TIMES 10^4 cell/ml.

Date	Site 700	Site 705
22 June 73	12.20 ± 0.05	.69 ± 1.90
13 July 73	6.32 ± 1.76	8.72 ± 6.27
18 July 73	11.70 ± 2.39	35.10 ± 9.20
1 Aug. 73	1.89 ± 0.95	discharge begun

The bog drainage in the Waskish area, site 801, produced a high standing crop in June, but the potential productivity decreased throughout the remainder of the season. The potential productivity of the discharge ditch, site 810, remained higher than site 801 for the entire season, indicating enrichment by the seepage and discharge from the paddies. Though the highest standing crop produced in the Waskish area occurred at site 810, as seen in Table 16, a 2.5 fold increase in the standing crop occurred when the August 8 water samples were spiked with 0.50 mg/l nitrogen indicating nitrogen limitation. The nutrients in the rice paddy effluents may be responsible for the increased standing crop produced in the Tamarac River water samples, site 900, on August 8 but their effect was short-lived as subsequent samples were less productive.

Samples were collected from Red Lake one-half mile (.8 km) from the mouth of the Tamarac River and at the outlet of Lower Red Lake. Assays of these samples indicated that the potential productivity of Red Lake was not influenced by rice paddy discharges at this time. The mean standing crops produced at these sites did not vary significantly from those produced by the Tamarac River water during summer

and fall. The last assays were conducted on water collected October 1, 1973.

Table 16. STANDING CROPS OF ALGAE PRODUCED AT THREE SITES AT WASKISH, MINNESOTA. ALL VALUES TIMES 10^4 cells/ml.

Date	Site 801	Site 810	Site 900
22 June 73	21.90 ± 2.00	25.6 ± 5.90	7.81 ± 1.48
10 July 73			12.10 ± 2.00
18 July 73	2.41 ± 1.20	7.98 ± 0.52	9.15 ± 2.86
1 Aug. 73	2.76 ± 2.28	.63 ± 0.31	3.73 ± 1.06
8 Aug. 73	0.88 ± 1.36	25.60 ± 9.50	15.00 ± 0.40
11 Aug. 73			6.41 ± 1.71
15 Aug. 73	0.27 ± 0.73	24.00 ± 6.50	2.27 ± 1.55
30 Aug. 73			8.57 ± 2.73
1 Oct. 73			2.22 ± 1.28

WATER BUDGETS

Water budgets were estimated for the Clearwater paddies from rainfall records, pumping records, estimates of spring bonus water, seepage and discharge water measurements. Each year pumping began about April 1 and continued through mid-July. In 1973 a dry spring reduced the rate of pumping and it was mid-May before complete flooding was achieved. Additional water was added only to replace seepage and evaporation losses during the growing season.

Spring bonus water, estimated to be 1.2 inches per acre (3.1 cm/ha), entered the paddies via runoff into the central supply ditch from surrounding land during April and early May of 1973. Pumping records show that 18.6 inches per acre (47.3 cm/ha) of water were added to the 620 acres (251 ha) from the Clearwater River by electrical lift pumps.[18]

Paddy seepage and August drawdown water returned to the river via a number of ditches. The only site where seepage could be effectively measured during the growing season was the 2,200 foot (670 m) ditch between a series of paddies, site 160. The entire flow in this ditch was assumed to be seepage since plugging of a culvert by the Clearwater Rice foreman, prevented bog water from entering the ditch. Measurements indicated that seepage was less during April and May, than in June and July, because of late flooding. Due to the number of discharge ditches, flow data during the August draindown were estimated.

A monthly water budget is shown in Table 17. The 1973 estimates of 21.1 inches per acre (53.6 cm/ha) of consumptive water use is in close agreement with the 1972 estimate of 20.6 inches per acre (52.32 cm/ha).[6] The seepage and discharge loss for the two years was nearly identical; the major difference was that the spring of 1973 was drier. During 1973 an additional 2.6 inches per acre (6.6 cm/ha) was pumped from the river. This plus the 1.4 inches (3.6 cm) of rain offset the additional runoff (bonus water) intercepted in 1972.

Low water levels and paddy design prevented estimates of water budgets at Waskish and the Ki-Wo-Say.

Table 17. CONSUMPTIVE WATER USE FOR A 620 ACRE DEVELOPMENT REPORTED AS INCHES PER ACRE

	March	April	May	June	July	August	Totals
Bonus water			1.2*				1.2
Pump water	.5	4.3	7.6	2.5	3.7		18.6
Rainfall		.9*	1.7	2.1	4.2		8.9
Seepage loss		-.30*	-.37	-.46	-.45		-1.6
Discharge water						- 6.0[a]	-6.0
						Total	21.1

[a] estimated

FLOW RATES FOR THE CLEARWATER RIVER

Flow rates for the Clearwater River were estimated from July 26 through August 21, 1973, at 3 sites: above all paddies, site 100; below 2,000 acres (800 ha), site 300; and below 4,000 acres (1,600 ha), site 600. The average flow for the period from July 26 to August 21 was 112 C.F.S. (3,200 l/sec) at site 100, 125 C.F.S. (3,570 l/sec) at site 300 and 175 C.F.S. (5,300 l/sec) at site 600. Flow rates shown in figure 5, indicate major discharges began August 2. Maximum flows of 325 C.F.S. (9,200 l/sec) at site 300 and 432 C.F.S. (12,200 l/sec) were observed August 10. By August 18, flow rates had returned to pre-discharge levels. Based on a mean flow of 175 C.F.S. (5,300 l/sec) at site 600 the increased flows, from August 2 to August 18, represented a total discharge of 2,700 acre feet (3,600 m^3) for the 4,000 acres (1,600 ha) of rice paddies.

This method of measuring stream flow was crude and no attempt was made to account for the additional flow resulting from the 2.4 inches (6.0 cm) of rain which fell from August 2 to August 9.

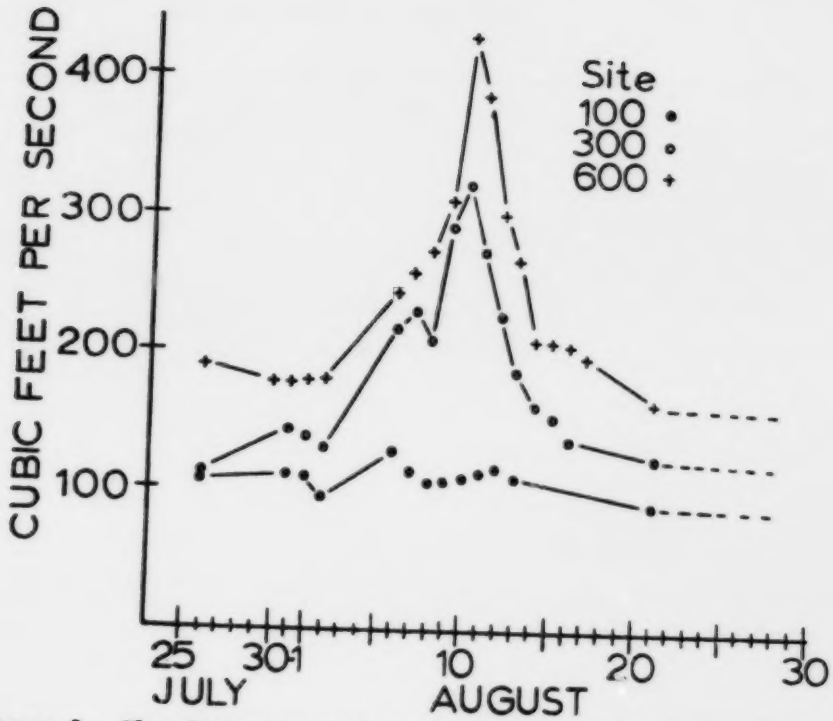

Figure 5. Flow Rates Measured at Three Sites on the Clearwater River in 1973

NUTRIENT LOADING

Loading From Paddy Seepage

Calculations of stream loading were done on a seasonal basis. The season was divided into growing seasons from April through the end of July and the discharge period in early August. The water discharged during the growing season was mainly seepage water. The weight of the material that is reported is the difference between the total weight of that parameter discharged and the amount found

in an equal volume of inlet water. The reported value then represents the contribution attributed to the respective paddies. The growing season data were calculated from weekly analyses and total weekly flow while discharge data was calculated from daily analyses and daily volumes. Results are shown in Table 18.

Prior to discharge 74 acre feet (90,000 m^3) of seepage water flowed through the 2,200 foot (670 m) discharge ditch, site 160. During the week of July 12 the concentrations of phosphorus and nitrogen increased sharply in the discharge ditch as a result of heavy rains. If these data were omitted from the values reported in Table 18 for total phosphorus the resultant factors would be significantly reduced. During the growing season total phosphorus, total Kjeldahl-nitrogen, ammonia-nitrogen, total dissolved solids, alkalinity, and calcium increased as the summer progressed, but no trends were evident in the discharge weights of potassium and magnesium.

Flooding of the Ki-Wo-Say paddies did not occur until the first week of June but monitoring of flows past site 410 in the seepage ditch began May 10. After flooding the flow of seepage averaged 1.3 acre feet (1,600 m^3) per week. The weights of phosphorus, and ammonia-nitrogen released from the Ki-Wo-Say paddies were similar to those found at site 160. Considering the smaller amount of water discharged at site 410, greater weights of metal ions, dissolved solids and alkalinity were released per acre foot of discharge.

At the Waskish paddies the seepage monitored at site 810 exhibited trends very similar to those observed at the Clearwater Rice paddies with the exception that more magnesium and less alkalinity were released per acre foot of seepage.

Table 18. THE POUNDS[a] OF SELECTED NUTRIENTS FOUND IN RICE PADDY SEEPAGE COMPARED TO THAT FOUND IN AN EQUAL VOLUME OF INTAKE WATER. WEIGHT IN POUNDS PER ACRE FOOT OF SEEPAGE.

Parameter	Site 160	Site 410	Site 810
Total-P	.33	.36	.28
TKN	1.9	4.7	1.3
Ammonia-N	.35	.54	.31
Total Dis. Solids	240	1280	50
Alkalinity ($CaCo_3$)	150	770	65
Calcium	31	170	18
Magnesium	-2.7	90	5
Potassium	1.4	15	1.8
Total Discharge	74 acre ft.	11 acre ft.	32 acre ft.

[a]Grams per cubic meter = Pounds per acre foot x .3676

Loading From Paddy Effluents

At site 160, the discharge flows were monitored from August 1 to August 9 when the dam holding the weir broke. During this period 34 acre feet (43,000 m^3) of water had been discharged. When compared to an equal volume of inlet water the paddies contributed .23 pounds per acre (.26 kg/ha) total phosphorus, 1.38 pounds per acre (1.56 kg/ha) total Kjeldahl-nitrogen and .14 pounds per acre (.16 kg/ha) ammonia-nitrogen. The data in Table 19 shows that while the paddies appeared to act as a sink for potassium and magnesium they released large amounts of calcium and dissolved solids. During the first seven days of the discharge period 2.4 inches (6.1 cm) of rainfall was recorded at site 160. This precipitation undoubtedly influenced the results at all sites along the Clearwater River.

Table 19. NUTRIENT ADDITIONS BY THREE RICE PADDY EFFLUENTS. LOADING AS POUNDS[a] PER ACRE DURING DISCHARGE.

Parameter	Site 160	Site 410	Site 810
Total-P	.23	-.08	.199
TKN-N	1.38	.85	.188
Ammonia-N	.14	-.56	-.113
Total Dis. Solids	130.	141.	178.
Calcium	24.	no data	no data
Magnesium	-1.6	5.12	-6.32
Potassium	-.132	.42	1.68
Acres of paddies	68	78	190

[a]Kilograms per hectare = pounds per acre x 1.12

The effluent from the unfertilized Ki-Wo-Say paddies flowing past site 410 carried less phosphorus and ammonia than was found in the inlet water. These paddies also released a large amount of dissolved solids, but did not act as traps for magnesium or potassium.

Data collected from site 810 indicated that the Waskish paddies removed ammonia-nitrogen and magnesium from the inlet water. Rainfall was also a problem at this site as 7.8 inches (20 cm) fell at the time of discharge, raising water flow in the creek.

Nutrient Loading In The Clearwater River

Stream flow measurements and chemical analyses were made on a frequent basis, see figure 5, during the major discharge period at three sites on the Clearwater River. Table 20, nutrient loads carried by the Clearwater River, was constructed by subtracting the weights of materials carried past site 100 from the total weights carried by an equal volume at site 600.

Table 20. ADDITIONAL NUTRIENT LOADS CARRIED BY THE CLEARWATER RIVER AT SITE 600 COMPARED TO AN EQUAL VOLUME OF WATER AT SITE 100 DURING DRAWDOWN, AUGUST 2 TO AUGUST 17. WEIGHT IN POUNDS[a] TIMES 10^3.

Parameter	Site 600
Total-P	4.6
TKN	23.3
Ammonia-N	2.1
Total Dis. Solids	2200.
Calcium	240.
Magnesium	83.
Potassium	17.

[a]kg = pounds x .4545

If the values reported in Table 20 for site 600 are divided by 4,000, the number of acres above that site, the quotient would estimate the contributions made by each acre of rice paddy. The results shown in table 21 exhibit a trend quite similar to that seen in table 19 for sites 160 and 410.

Table 21. NUTRIENT LOADING BY RICE PADDIES ALONG THE CLEARWATER RIVER. LOADING AS POUNDS[a] PER ACRE OF RICE LAND.

Parameter	Site 600
Total-P	1.1
TKN-N	5.8
Ammonia-N	.5
Total Dis. Solids	550.
Calcium	60.
Magnesium	21.
Potassium	4.2

[a]Kilograms per hectare = pounds per acre x 1.12

A comparison of tables 20 and 21 will reveal that the loading measured in the river is from 2.5 to 5 times the levels recorded in paddy effluents at sites 160, 410, and 810.

SOIL CHEMISTRY

The water logged soils of the rice paddies were studied to determine the levels of available soil phosphorus and the forms in which the phosphorus occurred. Fertilized and unfertilized organic soil paddies, site 125 and near site 405, constructed on sapric peat with layers of hemic peat as well as a mineral soil paddy, site 805, of the Chilgren series were examined in 1972.[19] Two additional mineral paddies (sites 705, 715) on soils classified as belonging to the Nebish-Rockwood series as well as an additional sapric peat paddy were included in 1973. The mineral paddies near Kelliher were originally open farmland located well above the water table. The peat paddies were developed from low bog grassland or grassland with mixed tamarack or small brush.

Prior to the flooding of the paddies in 1972 the general soil chemistry was studied. A summary of results is shown in Table 22.

Table 22. GENERAL CHARACTERISTICS OF THE PADDY SOILS

	pH	Total Phosphorus ppm/gram soil	Cation exchange meq/100 gram soil	Percent Organic Content
Mineral paddy	6.9	467	51	10.8
Organic unfert.	6.3	804	275	74.5
Organic fert.	6.6	1200	289	71.3

One year later under flooded conditions the same organic fertilized paddy had a cation exchange capacity of 159 meq/100g soil. However, 3 other organic paddies (sites 105, 115, 215) were found to have values of 273, 222, and 198 meq/100g soil, respectively. A new mineral paddy, site 705, and an older fertilized mineral paddy, site 715, had exchange capacities of 154 and 49. The moisture content of the flooded organic soils averaged 89 percent while mineral soils averaged 46 percent. Soil pH under flooded conditions ranged from 6.0 to 7.0 with a mean value of 6.7 for organic paddies, while the mineral paddies ranged from 6.7 to 7.2 with a mean value of 7.0.

During 1973 phosphorus fractions were extracted from the soils of six paddies. The analytical results for pH; available phosphorus; aluminum, iron, and calcium fractions; and total phosphorus appear in Table 63 in the appendix. Soil samples were taken from each site June 22, after the paddies had been flooded for one month; July 10, immediately after a major soil disturbance to simulate thinning; July 11, 24 hours after thinning; July 13, 72 hours after thinning; and on July 30. Variation in the results of soils analyzed at field moisture content made it difficult to attach significance to changes but general characteristics of soil are shown. Total phosphorus did not show up as concentrating in older organic paddies fertilized at 300 lbs/acre (336 kg/ha) of 18-18-17. This was also true for the fertilized paddy where application rates were unknown. Available phosphorus values ranged between 33 and 88 ppm/g soil for organic paddies if two larger values for disturbed soil were omitted. Aluminum phosphorus was found between 85 and 230 ppm/g soil and increased to a maximum for the late season sampling on organic soils in all cases. Iron phosphorus values were uniformly low and never exceeded 33 ppm/g soil

on mineral or organic soil sites. Calcium values ranged from 48 to 229 on organic soils during the time when no soil disturbance occurred. During the 1972 thinning of rice stands the mineral and organic paddies showed decreases in available phosphorus in the soil and increases in soluble phosphorus in the water. These results are shown in Table 23: Changes in soil and water phosphorus concentrations. In 1973 samples were studied at 1 minute, 24 hours, 72 hours, and 20 days after soil disturbance. Available phosphorus trends at six sites also show this decrease reaching a minimum at the 24-hour sampling period. These results can be seen in the appendix Table 63.

A close correlation with turbidity and soluble phosphorus levels for the thinning process was observed. Within sixty hours after thinning phosphorus and turbidity levels had returned to normal.

Table 23. CHANGES IN SOIL AND WATER PHOSPHORUS CONCENTRATIONS
SOIL = ppm/g soil WATER = mg/liter-P

	0 hours		0.1 hours		60 hours		158 hours	
	Soil	Water	Soil	Water	Soil	Water	Soil	Water
Fertilized Organic Soil	17.7	2.3[a]	9.8	3.0	8.3	2.7	17.3	2.3
Unfertilized Organic Soil	11.6	.02	7.6	.36	7.3	.02	9.8	.02
Mineral Soil	3.9	.04	2.0	.31	4.4	.04	4.1	.06

[a]Large value due to positive interference observed at this site. Total phosphorus values indicate soluble to be closer to .02 to .05 range.

Soil samples were taken from a uniform mixture of 8 inch (20 cm) cores. Comparison of 4 inch (10 cm) and 8 inch (20 cm) cores by Polfliet showed a marked increase in available phosphorus at the surface.[20]

Rather than looking at just available phosphorus the distribution of available aluminum, iron, calcium, and total phosphorus was determined at depths of 0-2.5 inches (0-6 cm), 2.5 - 8 inches (6-20 cm), and 8-12 inches (20-30 cm). The mineral paddy in production for several years showed increases in all forms of phosphorus with depth (See Table 24: Changes in soil phosphorus fractions with depth). Both the new and older organic paddies followed previously observed trends of decreases with depth for available phosphorus except for the middle portion of the first-year paddy.

Table 24. CHANGES IN SOIL PHOSPHORUS FRACTIONS WITH DEPTH. VALUES ARE REPORTED ppm/g.

	Avail. P	Al-P	Fe-P	Ca-P	Total-P	pH
Fertilized Mineral Soil Paddy (site 705)						
Upper[a]	27.	21	12	58	371	7.1
Middle[a]	3.6	34	40	140	492	7.1
Lower[a]	58.	100	35	161	510	7.0
First Year Organic Paddy - Fertilized (site 215)						
Upper	124	329	21	186	1258	6.8
Middle	446	247	12	149	1043	6.6
Lower	95	255	19	120	750	6.3
Organic Paddy (4 years production - fertilized) (site 125)						
Upper	124	134	13	118	1180	6.9
Middle	94	100	7	93	1250	6.9
Lower	59	124	12	46	1050	6.9

[a] Upper 0-2.5 inches (0-6.4 cm), middle 2.5-8 inches (6.4-20 cm), lower 8-12 inches (20-51 cm).

SECTION VI

DISCUSSION

The rapid expansion of the wild rice industry that has occurred since 1968 has slowed measurably. This temporary slowing has been caused by a combination of factors. The most important factor is a need to expand the limited market for the wild rice. Other contributing factors are the rising costs of land, increased costs of developing land for rice production, the costs of growing the crop and the high market value of other small grain crops. Speculators are seeking other agricultural investments while the present growers seem content to improve existing land to make management easier.

Costs for growing the crop should decrease as efforts to develop a nonshattering, disease resistant, seed succeed. Better seed and efforts by the industry to expand the market will encourage a gradual growth of the industry.

Increases in major nutrients were observed in the Clearwater River below large rice developments during the discharge periods in 1972 and 1973. Total phosphorus concentrations three times the summer mean of .140 mg/l were recorded below 4,000 acres (1,600 ha) of rice paddies. The increase in ammonia-nitrogen in the river during discharge was not statistically significant, while the twofold increase to 2.3 mg/l total Kjeldahl-nitrogen was. The marked increase in total

dissolved, filterable and volatile solids was also statistically significant. No significance could be attached to the small changes in turbidity, alkalinity, hardness, pH and metal ions that occurred in the Clearwater River.

The discharge from the paddies on mineral soil did not alter the phosphorus concentration of the South Branch of the Battle River; however, the total Kjeldahl-nitrogen concentrations increased from .64 to 1.54 mg/l. Little change was observed in the concentrations of other parameters, but filterable solids jumped significantly in the Battle River during discharge.

The drainage from the bog north of Upper Red Lake used to flood the Waskish paddies averaged .1 mg/l total phosphorus, .6 mg/l ammonia-nitrogen and 1.6 to 2.0 mg/l total Kjeldahl-nitrogen. Little, if any, change in the concentrations of the above parameters was observed in paddy effluents. Dissolved solids increased slightly and magnesium concentrations decreased but little change was observed in other parameters. The Tamarac River which receives the discharge from approximately 1,500 acres (600 ha) did not appear to be affected by rice paddy effluents.

Nutrient release from paddies in their first year of production was significantly greater than that observed in older paddies. Phosphorus and nitrogen levels were 2 to 4 times the levels found in the effluents from older paddies. This may have been due to the consistency of the peat soils. During the first growing season a great deal of fine floating material was evident in the new paddies, as well as higher concentrations of filterable solids and greater turbidity. This

suspension of fine particulates may be the major source of increased nutrients.

The discharge ditches from most paddies were simply channels cut from the paddy to the receiving stream. Very little if anything was done to stabilize the channel banks. During the first discharge considerable erosion occurs washing large volumes of peat into the watercourse. In subsequent years vegetation stabilizes the channel banks and erosion is reduced. The increased nutrients released from 1,000 acres (400 ha) of new paddies in 1973 may have partially accounted for the increased nutrient levels observed at site 600.

The seepage from rice paddies contains high concentrations of dissolved solids and moderate levels of nutrients leached from the paddy soils. Though seepage water represents a potential for considerable nutrient input into receiving streams, most paddy operators attempt to retain as much seepage as possible in their supply ditches. Rice paddies should be designed with a supply ditch near the center of the development and no ditches should be dug around the periphery. This would reduce seepage losses from the paddy system.

Estimates of nutrient loading, Table 18, made in the discharge ditches of older paddies are 2.5 - 5 times less than the estimates made at site 600, below 4,000 acres (1,600 ha) of rice paddies, Table 20. Three factors, two of which have already been mentioned, may account for this discrepancy.

1. The discharge from approximately 1,000 acres (400 ha) of first year paddies.

2. The additional nutrient input into the river resulting from the erosion of discharge ditches.

3. The runoff from the 2.4 inches (6.1 cm) of rain which fell during the discharge period in 1973. The 3.3 inches (8.4 cm) of rain which fell during the discharge period of 1972 may have resulted in an overestimate of phosphorus loading previously reported.[6]

Malathion tests were not run in 1973 due to the restricted application of this pesticide in the study area. Application time is governed by the appearance and concentration of rice worm (Apamea apamiformis). Most paddies were not sprayed as a result of low worm populations and those that were treated were sprayed after drawdown in late August. A new insect, the rice stalk borer (Chilo plejadellus) similar to the white rice stalk borer is becoming a problem. Since Malathion and Sevin appear ineffective against this organism,[20] new pesticides may be requested for approval to use on wild rice.

Insects will remain a problem for the industry and late season Malathion applications are expected to be the most common form of control.

Crop yields are improved on second year or older paddies by thinning the rice plants. Major soil disturbances occur in the top 6 inches (15 cm) of soil as thinning machinery moves over the flooded paddies. Fine particles from the soft peat soils become suspended increasing the turbidity, which returns to pre-thinning levels within 3 days. Soluble and total phosphorus were observed to follow the same trend as turbidity. Even though, interferences in the test for soluble phosphorus made exact values uncertain, it was felt that it followed the same trend as shown for total phosphorus in figure 6. The sharp increase in total phosphorus to 5.5 ppm resulting from thinning de-

creased to normal concentrations within 3 days. Both anaerobic soil conditions and phosphorus loosely sorbed to soil particles were thought to be factors.[21] Low iron concentrations in the soil indicated that the sorbed phosphorus may be the major source.

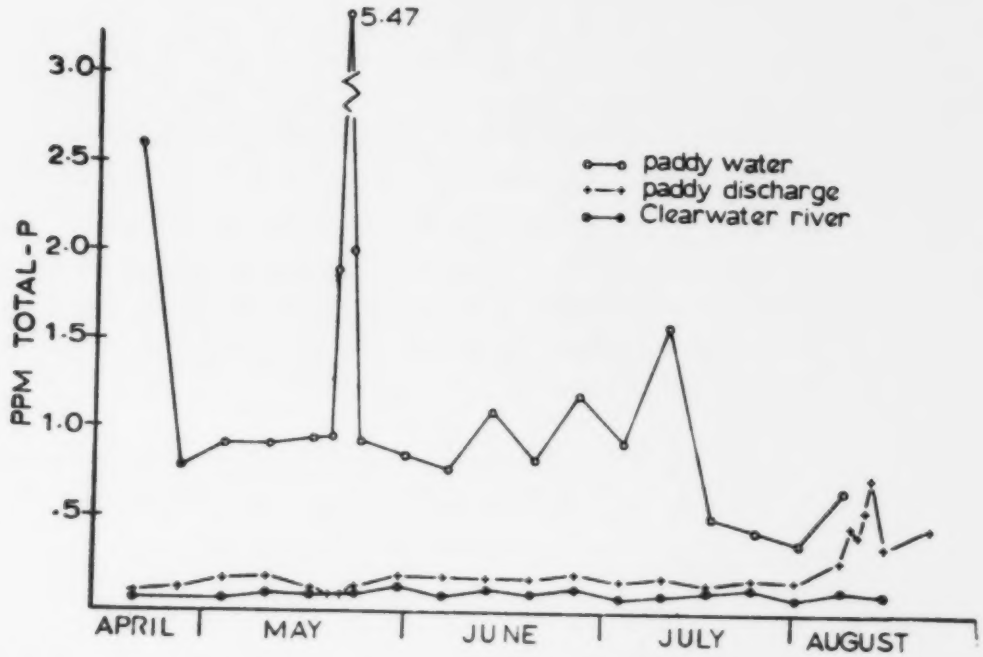

Figure 6. Seasonal phosphorus dynamics in an older fertilized paddy system on organic soil in Clearwater County, 1972.

Soil tests showed that available phosphorus concentrations reached a minimum 24 hours after thinning but returned to pre-thinning levels over the next 2 days. When major disturbances occur on newer paddies portions of the soil (bog mat) can float to the surface. In order to

protect the crop, water levels must be reduced to prevent movement of the soil mat. Lowering water levels prior to thinning would reduce this danger and prevent discharge at a time of high phosphorus levels.

Control of fall drawdown rates could reduce soil particles in the discharge. It would appear that slowing the drawdown rate, as surface soils became exposed along the edges of the inner ditches, would reduce filterable solids in the discharge. When drawdown is nearly complete increased levels of total phosphorus were observed in the final seepage from the paddy soil. At this time, the volume of water discharged is minimal and the total phosphorus concentrations rarely exceeded one milligram per liter.

Though similar increases were noted with major disturbances on mineral soils, the increases were not of the magnitude observed over peat. Studies conducted in 1972 showed that the greatest increases in total phosphorus concentrations in receiving streams occurred below fertilized paddies. These organic paddies had been fertilized annually with 18-18-17 NPK at the rate of 150 to 300 pounds per acre (168-336 kg/ha). This appeared to lead to an accumulation of total phosphorus in the upper 4 inches (10 cm) of soil.[19, 22] Tests conducted in 1973 on first year paddies confirmed this observation, but no accumulation was evident in the soils of older paddies. Either fertilizer applications were not at such a rate that would lead to accumulation in the upper portion of the soil or better removal of wood debris allowed rotovating of the soil to deeper levels after normal fall fertilizer application. The one fertilized mineral paddy studied showed increased levels of total phosphorus with depth. Smith, 1971, reported that if nitrogen levels were maintained on mineral

soils, that the addition of phosphorus did little to increase yields with phosphorus application.[23]

In general, results indicate phosphorus fertilizer applications could be reduced. However, the best answer to this question lies in the careful correlation of crop yield to fertilizer application. Research being done by the University of Minnesota[24] and records of rice producers will provide a better answer to this problem. The rising cost of fertilizers will encourage careful study of application rates and reduced usage is expected in the future as a result of economics alone.

Measurements of consumptive water use made in 1973 indicated 21.1 inches (53.6 cm) of water were needed per acre of rice land. E. Olke estimated water usage for the same development to be 21.9 inches (55.6 cm) based on data collected and expected evaporation losses.[2] Based on average weather conditions for the area in 1972 the average water usage predicted by three different theoretical measurements was 20.8 inches (52.8 cm) per acre.[4] This agrees closely with the field estimate of 20.6 inches (52.3 cm) made in 1972.[6] These values are in agreement with estimates made by paddy operators which vary from 18 to 24 inches (45-61 cm). Though year to year changes in weather conditions and differing soil types influencing seepage could cause deviations from the average, consumptive water use by rice paddies in northern Minnesota should range between 20 to 22 inches (50-56 cm).

Since the rice industry is a large water user care should be taken to restrict expansion of the industry to regions with an adequate water supply.

Algal assays conducted on Clearwater River water during the discharge periods of both 1972 and 1973 produced standing crops of algae significantly higher than most samples collected during non-discharge periods, figures 2 and 4. Samples collected at site 300 in July of 1972 after heavy rains also produced high standing crops of the test organism. During 1973 the standing crop of algae, produced in samples collected at site 600 on the Clearwater River, appeared to be unaffected by either heavy rains or rice paddy effluent.

Algal assays conducted at other sites, Kelliher and Waskish, indicate that there is considerable natural variation in the potential productivity in the area streams. Though increases in potential productivity resulting from rice paddy effluents were measured, the effect was short lived.

The results of the algal assays indicate that the Clearwater, Battle, and Tamarac Rivers were all nitrogen limited. Though increased levels of nitrogen and phosphorus from paddy effluents produced increased standing crops in samples from the receiving streams, the standing crop was only 20 percent of that produced in a synthetic medium indicating some other form of nutrient limitation or growth suppression. This may possibly be due to growth inhibition by lignin and humic compounds leached from the bogs which color the water in the area.[25]

Though the potential for major nutrient release from rice paddies during the growing season is high, good design, proper maintenance of water levels, and paddy dikes will prevent most accidents. As

the expansion of the industry slows and the paddy soils and discharge ditches stabilize, nutrient release from wild rice paddies may be similar to or less than that observed in many other agricultural endeavors.[20][27]

SECTION VII

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SECTION VIII

APPENDIX A

SUMMARY STATISTICS OF ANALYTICAL RESULTS BY SITE AND SEASON

Table			Page
25	Site 100-101	Summer	77
26	Site 100-101	Fall	78
27	Site 105	Summer	79
28	Site 115	Summer	80
29	Site 125	Summer	81
30	Site 140	Fall	82
31	Site 145	Summer	83
32	Site 155	Summer	84
33	Site 160	Summer	85
34	Site 160	Fall	86
35	Site 200	Summer	87
36	Site 210	Summer	88
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41	Site 300	Fall	93

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44	Site 405	Summer	96
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47	Site 500	Summer	99
48	Site 500	Fall	100
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51	Site 700	Summer	103
52	Site 700A	Fall	104
53	Site 705	Summer	105
54	Site 710	Fall	106
55	Site 715	Summer	107
56	Site 801	Summer	108
57	Site 801	Fall	109
58	Site 805	Summer	110
59	Site 810	Summer	111
60	Site 810	Fall	112
61	Site 900	Summer	113
62	Site 900	Fall	114

SITES 100 101

YEAR 72 TO 73
MONTH 3 4 5 6 7
DAY NO RESTRAINT
HOUR NO RESTRAINT

TYPE NO RESTRAINT

BASIN NO RESTRAINT
SUBBASIN NO RESTRAINT
LOCATION NO RESTRAINT

COUNTY NO RESTRAINT
TOWNSHIP NO RESTRAINT
LONGITUDE NO RESTRAINT
LATITUDE NO RESTRAINT

PARAMETER VALUE NO RESTRAINT

DEPTH NO RESTRAINT

T TEST (.05)

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X19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.060	LIMITS	.065	LOW	-.005	HIGH	.125
X20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.084	LIMITS	.009	LOW	.076	HIGH	.092
X22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.094	LIMITS	.014	LOW	.080	HIGH	.109
X23	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	.665	LIMITS	.086	LOW	.579	HIGH	.751
X24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.184	LIMITS	.046	LOW	.139	HIGH	.230
X25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.113	LIMITS	.033	LOW	.080	HIGH	.146
X02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	8.786	LIMITS	.801	LOW	7.984	HIGH	9.587
X03	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	3.295	LIMITS	.954	LOW	2.341	HIGH	4.249
X29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	245.208	LIMITS	18.388	LOW	234.820	HIGH	255.596
X30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	12.594	LIMITS	2.896	LOW	9.700	HIGH	15.491
X31	TOTAL VOLATILE SOLIDS (MG/L)	PARAMETER 31.	MEAN	96.676	LIMITS	6.489	LOW	90.188	HIGH	103.165
X18	PH LAB	PARAMETER 18.	MEAN	8.128	LIMITS	.071	LOW	8.057	HIGH	8.199
X37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	217.121	LIMITS	9.485	LOW	207.636	HIGH	226.607
X36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	228.548	LIMITS	5.709	LOW	222.751	HIGH	234.329
X38	CALCIUM MG/L	PARAMETER 38.	MEAN	50.213	LIMITS	2.179	LOW	48.034	HIGH	52.392
X39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	22.167	LIMITS	.566	LOW	21.622	HIGH	22.753
X41	POTASSIUM MG/L	PARAMETER 41.	MEAN	3.273	LIMITS	.293	LOW	2.981	HIGH	3.566
X99	RIVER MILEAGE									
X100	TIME									

PARAMETER 19.	MEAN	.060	MAX	1.6200	MIN	.0048	VARIANCE	.052	SAMPLE SIZE	50.
PARAMETER 20.	MEAN	.082	MAX	.6048	MIN	.0048	VARIANCE	.006	SAMPLE SIZE	4.
PARAMETER 22.	MEAN	.094	MAX	.6700	MIN	.0190	VARIANCE	.002	SAMPLE SIZE	49.
PARAMETER 23.	MEAN	.665	MAX	2.3000	MIN	.2400	VARIANCE	.086	SAMPLE SIZE	47.
PARAMETER 24.	MEAN	.184	MAX	.5300	MIN	.0200	VARIANCE	.023	SAMPLE SIZE	46.
PARAMETER 25.	MEAN	.113	MAX	.2000	MIN	.0500	VARIANCE	.003	SAMPLE SIZE	14.
PARAMETER 2.	MEAN	8.786	MAX	13.8000	MIN	4.2000	VARIANCE	4.259	SAMPLE SIZE	26.
PARAMETER 3.	MEAN	3.295	MAX	14.5000	MIN	.1000	VARIANCE	9.152	SAMPLE SIZE	41.
PARAMETER 29.	MEAN	245.208	MAX	288.0000	MIN	83.0000	VARIANCE	1271.317	SAMPLE SIZE	48.
PARAMETER 30.	MEAN	12.596	MAX	49.0000	MIN	1.0000	VARIANCE	96.724	SAMPLE SIZE	47.
PARAMETER 31.	MEAN	96.676	MAX	148.0000	MIN	36.0000	VARIANCE	345.438	SAMPLE SIZE	46.
PARAMETER 18.	MEAN	8.128	MAX	8.7000	MIN	7.9000	VARIANCE	.002	SAMPLE SIZE	50.
PARAMETER 37.	MEAN	217.121	MAX	300.0000	MIN	93.0000	VARIANCE	1015.783	SAMPLE SIZE	46.
PARAMETER 36.	MEAN	228.548	MAX	260.0000	MIN	181.0000	VARIANCE	411.315	SAMPLE SIZE	50.
PARAMETER 38.	MEAN	50.213	MAX	61.0000	MIN	20.0000	VARIANCE	54.780	SAMPLE SIZE	47.
PARAMETER 39.	MEAN	22.167	MAX	28.0000	MIN	10.0000	VARIANCE	3.773	SAMPLE SIZE	48.
PARAMETER 41.	MEAN	3.273	MAX	5.2000	MIN	1.4000	VARIANCE	1.026	SAMPLE SIZE	49.

Table 25. Site 100-101 SUMMER

```
SITES                100    101

YEAR                  70 TO  73
MONTH                  4      6        10
DAY                NO RESTRAINT
HOUR               NO RESTRAINT

TYPE               NO RESTRAINT

BASIN              NO RESTRAINT
SUBBASIN           NO RESTRAINT
LOCATION           NO RESTRAINT

COUNTY             NO RESTRAINT
TOWNSHIP           NO RESTRAINT
LONGITUDE          NO RESTRAINT
LATITUDE           NO RESTRAINT

PARAMETER VALUE    NO RESTRAINT

DEPTH              NO RESTRAINT                    T TEST  (.05)

X19   SOLUBLE ORTHO PHOSPHORUS (MG/L)    PARAMETER 19.  MEAN     .030 LIMITS     .020  LOW     .039  HIGH     .040
X20   TOTAL SOLUBLE PHOSPHORUS           PARAMETER 20.  MEAN     .000 LIMITS     .000  LOW     .000  HIGH     .000
X22   TOTAL PHOSPHORUS                   PARAMETER 22.  MEAN     .084 LIMITS     .014  LOW     .066  HIGH     .102
X23   KJEDAHL NITROGEN (MG/L)            PARAMETER 23.  MEAN     .608 LIMITS     .144  LOW     .464  HIGH     .752
X24   AMMONIA NITROGEN (MG/L)            PARAMETER 24.  MEAN     .267 LIMITS     .104  LOW     .163  HIGH     .371
X25   NITRATE - NITROGEN (MG/L)          PARAMETER 25.  MEAN     .110 LIMITS     .075  LOW     .035  HIGH     .184
X02   DISSOLVED OXYGEN                   PARAMETER  2.  MEAN    8.217 LIMITS     .856  LOW    7.360  HIGH    9.073
X03   TURBIDITY IN JACKSON UNITS         PARAMETER  3.  MEAN    2.764 LIMITS    2.236  LOW     .528  HIGH    4.998
X29   TOTAL DISSOLVED SOLIDS (MG/L)      PARAMETER 29.  MEAN  218.143 LIMITS  13.432  LOW  204.711  HIGH  231.575
X30   TOTAL FILTERABLE SOLIDS (MG/L)     PARAMETER 30.  MEAN   11.214 LIMITS    4.889  LOW    6.325  HIGH   16.103
X31   TOTAL VOLATILE SOLIDS (MG/L)       PARAMETER 31.  MEAN   87.333 LIMITS   10.040  LOW   77.293  HIGH   97.373
X18   PH LAB                             PARAMETER 18.  MEAN    8.137 LIMITS     .141  LOW    7.997  HIGH    8.278
X37   HARDNESS FROM CA AND MG            PARAMETER 37.  MEAN  193.484 LIMITS    9.263  LOW  184.220  HIGH  202.747
X36   ALKALINITY AS CACO3                PARAMETER 36.  MEAN  206.571 LIMITS    8.525  LOW  198.047  HIGH  215.096
X38   CALCIUM          MG/L              PARAMETER 38.  MEAN   41.920 LIMITS    4.022  LOW   37.907  HIGH   45.950
X39   MAGNESIUM        MG/L              PARAMETER 39.  MEAN   22.526 LIMITS    1.486  LOW   21.042  HIGH   24.011
X41   POTASSIUM        MG/L              PARAMETER 41.  MEAN    3.563 LIMITS     .616  LOW    2.950  HIGH    4.177
X99   RIVER MILEAGE
X100  TIME

PARAMETER 19.   MEAN      .039   MAX     .1250   MIN     .0050   VARIANCE     .002   SAMPLE SIZE   17.
PARAMETER 20.   MEAN      .000   MAX     .0000   MIN     .0000   VARIANCE     .000   SAMPLE SIZE    6.
PARAMETER 22.   MEAN      .084   MAX     .1330   MIN     .0220   VARIANCE     .001   SAMPLE SIZE   17.
PARAMETER 23.   MEAN      .608   MAX    1.1600   MIN     .3400   VARIANCE     .062   SAMPLE SIZE   14.
PARAMETER 24.   MEAN      .267   MAX     .5300   MIN     .0350   VARIANCE     .038   SAMPLE SIZE   16.
PARAMETER 25.   MEAN      .110   MAX     .1800   MIN     .0800   VARIANCE     .002   SAMPLE SIZE    4.
PARAMETER  2.   MEAN    8.217    MAX    9.7000   MIN    7.5000   VARIANCE     .666   SAMPLE SIZE    6.
PARAMETER  3.   MEAN    2.764    MAX   11.5000   MIN     .1000   VARIANCE   11.075   SAMPLE SIZE   11.
PARAMETER 29.   MEAN  218.143    MAX  252.0000   MIN  164.0000   VARIANCE   56.363   SAMPLE SIZE   14.
PARAMETER 30.   MEAN   11.214    MAX   33.0000   MIN    4.0000   VARIANCE   71.720   SAMPLE SIZE   14.
PARAMETER 31.   MEAN   87.333    MAX  119.0000   MIN   58.0000   VARIANCE  240.697   SAMPLE SIZE   12.
PARAMETER 18.   MEAN    8.137    MAX    8.4000   MIN    7.9000   VARIANCE     .028   SAMPLE SIZE    8.
PARAMETER 37.   MEAN  193.484    MAX  227.9040   MIN  165.8730   VARIANCE  257.484   SAMPLE SIZE   14.
PARAMETER 36.   MEAN  206.571    MAX  224.0000   MIN  185.0000   VARIANCE   84.952   SAMPLE SIZE    7.
PARAMETER 38.   MEAN   41.920    MAX   50.0000   MIN   34.0000   VARIANCE   48.533   SAMPLE SIZE   14.
PARAMETER 39.   MEAN   22.526    MAX   27.0000   MIN   13.0000   VARIANCE    9.485   SAMPLE SIZE   19.
PARAMETER 41.   MEAN    3.563    MAX    5.8000   MIN    2.0000   VARIANCE    1.620   SAMPLE SIZE   19.
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Table 26. Site 100-101 FALL

```
SITES                105

YEAR                  70 TO  73
MONTH                  1   4      5      6      7
DAY                 NO RESTRAINT
HOUR                NO RESTRAINT

TYPE                NO RESTRAINT

BASIN               NO RESTRAINT
SUBBASIN            NO RESTRAINT
LOCATION            NO RESTRAINT

COUNTY              NO RESTRAINT
TOWNSHIP            NO RESTRAINT
LONGITUDE           NO RESTRAINT
LATITUDE            NO RESTRAINT

PARAMETER VALUE     NO RESTRAINT

DEPTH               NO RESTRAINT                    T TEST  (.05)

X19   SOLUBLE ORTHO PHOSPHORUS (MG/L)      PARAMETER 19.  MEAN     .418 UNITS     .110 LOW     .291 HIGH     .420
X20   TOTAL SOLUBLE PHOSPHORUS              PARAMETER 20.  MEAN     .000 UNITS     .000 LOW     .000 HIGH     .000
X22   TOTAL PHOSPHORUS                      PARAMETER 22.  MEAN     .527 UNITS     .101 LOW     .426 HIGH     .470
X23   KJEDAHL NITROGEN (MG/L)               PARAMETER 23.  MEAN    2.196 UNITS     .466 LOW    1.730 HIGH    2.442
X24   AMMONIA NITROGEN (MG/L)               PARAMETER 24.  MEAN     .266 UNITS     .203 LOW     .063 HIGH     .469
X25   NITRATE - NITROGEN (MG/L)             PARAMETER 25.  MEAN     .000 UNITS     .000 LOW     .000 HIGH     .000
X02   DISSOLVED OXYGEN                      PARAMETER  2.  MEAN    5.520 UNITS    1.285 LOW    4.235 HIGH    6.805
X03   TURBIDITY IN JACKSON UNITS            PARAMETER  3.  MEAN   14.360 UNITS    8.754 LOW    5.606 HIGH   23.074
X29   TOTAL DISSOLVED SOLIDS (MG/L)         PARAMETER 29.  MEAN  415.366 UNITS   35.186 LOW  380.179 HIGH  450.448
X30   TOTAL FILTERABLE SOLIDS (MG/L)        PARAMETER 30.  MEAN    6.636 UNITS    4.558 LOW    1.078 HIGH   12.194
X31   TOTAL VOLATILE SOLIDS (MG/L)          PARAMETER 31.  MEAN  197.418 UNITS   26.527 LOW  171.291 HIGH  224.365
X18   PH LAB                                PARAMETER 18.  MEAN    8.000 UNITS     .173 LOW    7.827 HIGH    8.173
X37   HARDNESS FROM CA AND MG               PARAMETER 37.  MEAN  308.609 UNITS   19.268 LOW  289.341 HIGH  327.878
X36   ALKALINITY AS CACO3                   PARAMETER 36.  MEAN  333.273 UNITS   24.504 LOW  308.768 HIGH  357.777
X38   CALCIUM              MG/L             PARAMETER 38.  MEAN   74.800 UNITS    5.848 LOW   68.952 HIGH   80.648
X39   MAGNESIUM            MG/L             PARAMETER 39.  MEAN   29.545 UNITS    1.787 LOW   27.759 HIGH   31.332
X41   POTASSIUM            MG/L             PARAMETER 41.  MEAN   11.100 UNITS    2.113 LOW    8.987 HIGH   13.213
X99   RIVER MILEAGE
X100  TIME

PARAMETER 19.  MEAN      .418  MAX      .9400  MIN      .1000  VARIANCE      .021  SAMPLE SIZE  11.
PARAMETER 20.  MEAN      .000  MAX      .0000  MIN      .0000  VARIANCE      .000  SAMPLE SIZE   8.
PARAMETER 22.  MEAN      .527  MAX      .7600  MIN      .2000  VARIANCE      .023  SAMPLE SIZE  11.
PARAMETER 23.  MEAN     2.196  MAX    4.0400  MIN    1.4600  VARIANCE      .481  SAMPLE SIZE  11.
PARAMETER 24.  MEAN      .266  MAX    1.0700  MIN      .0750  VARIANCE      .092  SAMPLE SIZE  11.
PARAMETER 25.  MEAN      .000  MAX      .0000  MIN      .0000  VARIANCE      .000  SAMPLE SIZE   9.
PARAMETER  2.  MEAN    5.520  MAX    6.8000  MIN    4.0000  VARIANCE    1.072  SAMPLE SIZE  10.
PARAMETER  3.  MEAN   14.360  MAX   38.5000  MIN    1.4000  VARIANCE  140.100  SAMPLE SIZE  11.
PARAMETER 29.  MEAN  415.366  MAX  495.0000  MIN  333.0000  VARIANCE 2743.254  SAMPLE SIZE  11.
PARAMETER 30.  MEAN    6.636  MAX   29.0000  MIN    2.0000  VARIANCE   68.455  SAMPLE SIZE  11.
PARAMETER 31.  MEAN  197.418  MAX  262.0000  MIN  104.0000  VARIANCE 1559.364  SAMPLE SIZE  11.
PARAMETER 18.  MEAN    8.000  MAX    8.4000  MIN    7.4000  VARIANCE     .066  SAMPLE SIZE  11.
PARAMETER 37.  MEAN  308.609  MAX  340.5820  MIN  265.9460  VARIANCE  725.414  SAMPLE SIZE  11.
PARAMETER 36.  MEAN  333.273  MAX  383.8000  MIN  278.0000  VARIANCE 1330.418  SAMPLE SIZE  11.
PARAMETER 38.  MEAN   74.800  MAX   85.0000  MIN   62.0000  VARIANCE   66.844  SAMPLE SIZE  10.
PARAMETER 39.  MEAN   29.545  MAX   33.0000  MIN   25.0000  VARIANCE    7.073  SAMPLE SIZE  11.
PARAMETER 41.  MEAN   11.100  MAX   14.0000  MIN    9.1000  VARIANCE    9.894  SAMPLE SIZE  11.
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Table 27. Site 105 SUMMER

```
SITES                115

YEAR                  70 TO  73
MONTH                  1   4      5      6      7
DAY                NO RESTRAINT
HOUR               NO RESTRAINT

TYPE               NO RESTRAINT

BASIN              NO RESTRAINT
SUBBASIN           NO RESTRAINT
LOCATION           NO RESTRAINT

COUNTY             NO RESTRAINT
TOWNSHIP           NO RESTRAINT
LONGITUDE          NO RESTRAINT
LATITUDE           NO RESTRAINT

PARAMETER VALUE    NO RESTRAINT

DEPTH              NO RESTRAINT                    T TEST  (.05)

*19   SOLUBLE ORTHO PHOSPHORUS (MG/L)      PARAMETER 19.  MEAN   1.139  UNITS      .324  LOW      .812  HIGH   1.466
*20   TOTAL SOLUBLE PHOSPHORUS             PARAMETER 20.  MEAN    .000  UNITS      .000  LOW      .000  HIGH    .000
*22   TOTAL PHOSPHORUS                     PARAMETER 22.  MEAN   1.310  UNITS      .562  LOW      .748  HIGH   1.872
*23*  KJELDAHL NITROGEN (MG/L)             PARAMETER 23.  MEAN   1.924  UNITS      .200  LOW     1.715  HIGH   2.132
*24   AMMONIA NITROGEN (MG/L)              PARAMETER 24.  MEAN    .414  UNITS      .677  LOW     -.041  HIGH   1.703
*25   NITRATE - NITROGEN (MG/L)            PARAMETER 25.  MEAN    .000  UNITS      .000  LOW      .000  HIGH    .000
*62   DISSOLVED OXYGEN                     PARAMETER  2.  MEAN   8.833  UNITS     2.232  LOW     4.601  HIGH   9.065
*83   TURBIDITY IN JACKSON UNITS           PARAMETER  3.  MEAN  25.071  UNITS     9.635  LOW    15.436  HIGH  34.706
*20   TOTAL DISSOLVED SOLIDS (MG/L)        PARAMETER 20.  MEAN 344.447  UNITS    28.445  LOW   330.221  HIGH 358.154
*10   TOTAL FILTERABLE SOLIDS (MG/L)       PARAMETER 30.  MEAN  19.552  UNITS    11.532  LOW     8.021  HIGH  31.084
*31   TOTAL VOLATILE SOLIDS (MG/L)         PARAMETER 31.  MEAN 160.062  UNITS    17.295  LOW   142.767  HIGH 177.358
*14   PH (LAB                              PARAMETER 14.  MEAN   8.159  UNITS      .115  LOW     8.044  HIGH   8.274
*17   HARDNESS FROM CA AND MG              PARAMETER 37.  MEAN 284.453  UNITS    16.286  LOW   268.167  HIGH 300.739
*36   ALKALINITY AS CACO3                  PARAMETER 36.  MEAN 309.500  UNITS    22.145  LOW   287.355  HIGH 331.645
*19   CALCIUM              MG/L            PARAMETER 38.  MEAN  88.714  UNITS     6.588  LOW    82.126  HIGH  95.302
*19   MAGNESIUM            MG/L            PARAMETER 39.  MEAN  24.513  UNITS     1.288  LOW    23.225  HIGH  25.801
*41   POTASSIUM            MG/L            PARAMETER 41.  MEAN  11.570  UNITS     2.268  LOW     9.302  HIGH  13.838
*99   RIVER MILEAGE
*100  TIME

PARAMETER 19.   MEAN    1.139   MAX    2.1000   MIN     .1650   VARIANCE     .403   SAMPLE SIZE  17.
PARAMETER 20.   MEAN     .000   MAX     .0000   MIN     .0000   VARIANCE     .000   SAMPLE SIZE   0.
PARAMETER 22.   MEAN    1.310   MAX    3.4000   MIN     .2740   VARIANCE    1.035   SAMPLE SIZE  16.
PARAMETER 23.   MEAN    1.924   MAX    2.7400   MIN     .9600   VARIANCE     .165   SAMPLE SIZE  17.
PARAMETER 24.   MEAN     .414   MAX    5.6500   MIN     .0600   VARIANCE    1.733   SAMPLE SIZE  17.
PARAMETER 25.   MEAN     .000   MAX     .0000   MIN     .0000   VARIANCE     .000   SAMPLE SIZE   0.
PARAMETER  2.   MEAN    8.833   MAX    9.2000   MIN    3.5000   VARIANCE     .523   SAMPLE SIZE   6.
PARAMETER  3.   MEAN   25.071   MAX   58.0000   MIN    2.4000   VARIANCE  351.146   SAMPLE SIZE  17.
PARAMETER 20.   MEAN  344.447   MAX  432.0000   MIN  279.0000   VARIANCE 2855.029   SAMPLE SIZE  16.
PARAMETER 30.   MEAN   19.552   MAX   92.0000   MIN    5.0000   VARIANCE  488.529   SAMPLE SIZE  16.
PARAMETER 31.   MEAN  160.062   MAX  236.0000   MIN  101.0000   VARIANCE 1053.029   SAMPLE SIZE  16.
PARAMETER 14.   MEAN    8.159   MAX    8.5000   MIN    7.7000   VARIANCE     .050   SAMPLE SIZE  17.
PARAMETER 37.   MEAN  284.453   MAX  334.1064   MIN  246.1070   VARIANCE  726.879   SAMPLE SIZE  13.
PARAMETER 36.   MEAN  309.500   MAX  387.0000   MIN  232.0008   VARIANCE 1727.867   SAMPLE SIZE  16.
PARAMETER 38.   MEAN   88.714   MAX   96.0000   MIN   58.0000   VARIANCE   62.006   SAMPLE SIZE  16.
PARAMETER 39.   MEAN   24.513   MAX   32.0000   MIN   23.0000   VARIANCE    5.410   SAMPLE SIZE  16.
PARAMETER 41.   MEAN   11.570   MAX   16.3000   MIN    3.6000   VARIANCE   20.020   SAMPLE SIZE  14.
```

Table 28. Site 115 SUMMER

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SITES 125

YEAR 70 TO 73
MONTH 4 5 6 7 8
DAY NO RESTRAINT
HOUR NO RESTRAINT

TYPE NO RESTRAINT

BASIN NO RESTRAINT
SUBBASIN NO RESTRAINT
LOCATION NO RESTRAINT

COUNTY NO RESTRAINT
TRANSMID NO RESTRAINT
LONGITUDE NO RESTRAINT
LATITUDE NO RESTRAINT

PARAMETER VALUE NO RESTRAINT

DEPTH NO RESTRAINT

T TEST (.05)

X19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	1.499	LIMITS	.374	LOW	1.125	HIGH	1.873
X20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.980	LIMITS	.000	LOW	.980	HIGH	.980
X22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.990	LIMITS	.240	LOW	.750	HIGH	1.230
X23	KJELDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	1.707	LIMITS	.186	LOW	1.522	HIGH	1.893
X24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.538	LIMITS	.162	LOW	.377	HIGH	.700
X25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.072	LIMITS	.018	LOW	.054	HIGH	.090
X02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	5.737	LIMITS	.922	LOW	4.815	HIGH	6.659
X13	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	6.726	LIMITS	2.576	LOW	4.150	HIGH	9.302
X09	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	303.132	LIMITS	15.378	LOW	287.754	HIGH	318.510
X10	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	24.923	LIMITS	20.085	LOW	4.838	HIGH	45.008
X11	TOTAL VOLATIPLE SOLIDS (MG/L)	PARAMETER 31.	MEAN	132.972	LIMITS	9.960	LOW	123.033	HIGH	142.912
X18	PH LAB	PARAMETER 18.	MEAN	7.981	LIMITS	.128	LOW	7.854	HIGH	8.109
X37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	251.232	LIMITS	16.732	LOW	234.500	HIGH	267.964
X36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	260.388	LIMITS	20.684	LOW	239.694	HIGH	281.084
X38	CALCIUM MG/L	PARAMETER 38.	MEAN	61.400	LIMITS	4.297	LOW	57.103	HIGH	65.697
X39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	24.000	LIMITS	1.491	LOW	22.509	HIGH	25.491
X40	POTASSIUM MG/L	PARAMETER 41.	MEAN	7.688	LIMITS	1.076	LOW	6.613	HIGH	8.764
X100	RIVER MILEAGE									
X100	TIME									

PARAMETER 19.	MEAN	1.499	MAX	6.1600	MIN	.0170	VARIANCE	1.961	SAMPLE SIZE	50.
PARAMETER 20.	MEAN	.980	MAX	.0800	MIN	.0800	VARIANCE	.000	SAMPLE SIZE	50.
PARAMETER 22.	MEAN	.990	MAX	5.3800	MIN	.0980	VARIANCE	.746	SAMPLE SIZE	52.
PARAMETER 23.	MEAN	1.707	MAX	3.7600	MIN	.4000	VARIANCE	.474	SAMPLE SIZE	52.
PARAMETER 24.	MEAN	.538	MAX	2.9400	MIN	.0750	VARIANCE	.340	SAMPLE SIZE	52.
PARAMETER 25.	MEAN	.072	MAX	.1500	MIN	.0300	VARIANCE	.001	SAMPLE SIZE	18.
PARAMETER 2.	MEAN	5.737	MAX	11.2000	MIN	2.1000	VARIANCE	7.180	SAMPLE SIZE	35.
PARAMETER 3.	MEAN	6.726	MAX	39.0000	MIN	.3000	VARIANCE	74.896	SAMPLE SIZE	46.
PARAMETER 29.	MEAN	303.132	MAX	441.0000	MIN	165.0000	VARIANCE	3133.462	SAMPLE SIZE	53.
PARAMETER 30.	MEAN	24.923	MAX	406.0000	MIN	1.0000	VARIANCE	5244.267	SAMPLE SIZE	52.
PARAMETER 31.	MEAN	132.972	MAX	200.0000	MIN	82.0000	VARIANCE	872.642	SAMPLE SIZE	36.
PARAMETER 18.	MEAN	7.981	MAX	9.6000	MIN	7.2000	VARIANCE	.215	SAMPLE SIZE	53.
PARAMETER 37.	MEAN	251.232	MAX	367.9120	MIN	67.0000	VARIANCE	3367.005	SAMPLE SIZE	44.
PARAMETER 36.	MEAN	260.388	MAX	391.0000	MIN	2.0000	VARIANCE	5251.342	SAMPLE SIZE	50.
PARAMETER 38.	MEAN	61.400	MAX	92.0000	MIN	25.0000	VARIANCE	226.571	SAMPLE SIZE	50.
PARAMETER 39.	MEAN	24.000	MAX	40.0000	MIN	11.0000	VARIANCE	27.265	SAMPLE SIZE	50.
PARAMETER 41.	MEAN	7.688	MAX	19.1000	MIN	.9000	VARIANCE	14.744	SAMPLE SIZE	51.

Table 29. Site 125 SUMMER

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SITES                 140

YEAR                  70 TO  73
MONTH                  4      4        16
DAY                NO RESTRAINT
HOUR               NO RESTRAINT

TYPE               NO RESTRAINT

BASIN              NO RESTRAINT
SUBBASIN           NO RESTRAINT
LOCATION           NO RESTRAINT

COUNTY             NO RESTRAINT
TOWNSHIP           NO RESTRAINT
LONGITUDE          NO RESTRAINT
LATITUDE           NO RESTRAINT

PARAMETER VALUE    NO RESTRAINT

DEPTH              NO RESTRAINT                    T TEST (.05)

X19   SOLUBLE ORTHO PHOSPHORUS (MG/L)
X20   TOTAL SOLUBLE PHOSPHORUS
X22   TOTAL PHOSPHORUS
X23   KJEDAHL NITROGEN (MG/L)
X24   AMMONIA NITROGEN (MG/L)
X25   NITRATE - NITROGEN (MG/L)
X02   DISSOLVED OXYGEN
X03   TURBIDITY IN JACKSON UNITS
X29   TOTAL DISSOLVED SOLIDS (MG/L)
X30   TOTAL FILTERABLE SOLIDS (MG/L)
X31   TOTAL VOLATILE SOLIDS (MG/L)
X18   PH LAB
X37   HARDNESS FROM CA AND MG
X36   ALKALINITY AS CACO3
X38   CALCIUM                MG/L
X39   MAGNESIUM              MG/L
X41   POTASSIUM              MG/L
X99   RIVER MILEAGE
X100  TIME

PARAMETER 19.   MEAN    .3201 UNITS    .001  LOW    .247  HIGH    .409
PARAMETER 20.   MEAN    .0001 UNITS    .000  LOW    .000  HIGH    .000
PARAMETER 22.   MEAN    .3531 UNITS    .100  LOW    .265  HIGH    .442
PARAMETER 23.   MEAN   1.4971 UNITS    .220  LOW   1.277  HIGH   1.717
PARAMETER 24.   MEAN    .1411 UNITS    .098  LOW    .043  HIGH    .239
PARAMETER 25.   MEAN    .0001 UNITS    .000  LOW    .000  HIGH    .000
PARAMETER  2.   MEAN    .0001 UNITS    .000  LOW    .000  HIGH    .000
PARAMETER  3.   MEAN    .0001 UNITS    .000  LOW    .000  HIGH    .000
PARAMETER 29.   MEAN 371.3571 UNITS  33.067  LOW 338.290  HIGH 404.424
PARAMETER 30.   MEAN  28.5711 UNITS  33.741  LOW  -5.189  HIGH  62.332
PARAMETER 31.   MEAN 172.1431 UNITS  18.906  LOW 151.236  HIGH 193.052
PARAMETER 18.   MEAN    .0001 UNITS    .000  LOW    .000  HIGH    .000
PARAMETER 37.   MEAN 318.9801 UNITS  23.491  LOW 294.488  HIGH 343.471
PARAMETER 36.   MEAN    .0001 UNITS    .000  LOW    .000  HIGH    .000
PARAMETER 38.   MEAN  72.0001 UNITS   5.081  LOW  66.919  HIGH  77.081
PARAMETER 39.   MEAN  32.5001 UNITS   2.628  LOW  29.872  HIGH  35.128
PARAMETER 41.   MEAN   6.4571 UNITS    .477  LOW   5.980  HIGH   6.934

PARAMETER 19.   MEAN     .328   MAX     .6760   MIN     .1450   VARIANCE     .020   SAMPLE SIZE   14.
PARAMETER 20.   MEAN     .000   MAX     .0000   MIN     .0000   VARIANCE     .000   SAMPLE SIZE    0.
PARAMETER 22.   MEAN     .353   MAX     .6300   MIN     .0480   VARIANCE     .030   SAMPLE SIZE   14.
PARAMETER 23.   MEAN    1.497   MAX    2.4400   MIN    1.0600   VARIANCE     .133   SAMPLE SIZE   14.
PARAMETER 24.   MEAN     .141   MAX     .5100   MIN     .0450   VARIANCE     .024   SAMPLE SIZE   14.
PARAMETER 25.   MEAN     .000   MAX     .0000   MIN     .0000   VARIANCE     .000   SAMPLE SIZE    0.
PARAMETER  2.   MEAN     .000   MAX     .0000   MIN     .0000   VARIANCE     .000   SAMPLE SIZE    0.
PARAMETER  3.   MEAN     .000   MAX     .0000   MIN     .0000   VARIANCE     .000   SAMPLE SIZE    0.
PARAMETER 29.   MEAN  371.357   MAX  479.0000   MIN  296.0000   VARIANCE 3281.016   SAMPLE SIZE   14.
PARAMETER 30.   MEAN   28.571   MAX  230.0000   MIN    3.0000   VARIANCE 3420.110   SAMPLE SIZE   14.
PARAMETER 31.   MEAN  172.143   MAX  231.0000   MIN  123.0000   VARIANCE 1072.901   SAMPLE SIZE   14.
PARAMETER 18.   MEAN     .000   MAX     .0000   MIN     .0000   VARIANCE     .000   SAMPLE SIZE    0.
PARAMETER 37.   MEAN  318.980   MAX  371.4910   MIN  260.0740   VARIANCE 1222.855   SAMPLE SIZE   11.
PARAMETER 36.   MEAN     .000   MAX     .0000   MIN     .0000   VARIANCE     .000   SAMPLE SIZE    0.
PARAMETER 38.   MEAN   72.000   MAX   83.0000   MIN   58.0000   VARIANCE   57.200   SAMPLE SIZE   11.
PARAMETER 39.   MEAN   32.500   MAX   40.0000   MIN   27.0000   VARIANCE   20.731   SAMPLE SIZE   14.
PARAMETER 41.   MEAN    6.457   MAX    6.2000   MIN    3.5000   VARIANCE     .883   SAMPLE SIZE   14.
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Table 30. Site 140 FALL

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SITES                 145

YEAR                  70 TO 73
MONTH                  6    6      6     7     8
DAY                   NO RESTRAINT
HOUR                  NO RESTRAINT

TYPE                  NO RESTRAINT

BASIN
SUBBASIN              NO RESTRAINT
LOCATION              NO RESTRAINT

COUNTY                NO RESTRAINT
TOWNSHIP              NO RESTRAINT
LONGITUDE             NO RESTRAINT
LATITUDE              NO RESTRAINT

PARAMETER VALUE       NO RESTRAINT

DEPTH                 NO RESTRAINT                    T TEST  (.05)

X19   SOLUBLE ORTHO PHOSPHORUS (MG/L)
X20   TOTAL SOLUBLE PHOSPHORUS
X22   TOTAL PHOSPHORUS
X23   KJEDAHL NITROGEN (MG/L)
X24   AMMONIA NITROGEN (MG/L)
X25   NITRATE - NITROGEN (MG/L)
X02   DISSOLVED OXYGEN
X03   TURBIDITY IN JACKSON UNITS
X29   TOTAL DISSOLVED SOLIDS (MG/L)
X30   TOTAL FILTERABLE SOLIDS (MG/L)
X31   TOTAL VOLATILE SOLIDS (MG/L)
X18   PH, LAB
X37   HARDNESS FROM CA AND MG
X36   ALKALINITY AS CACO3
X38   CALCIUM                MG/L
X39   MAGNESIUM              MG/L
X41   POTASSIUM              MG/L
X99   RIVER MILEAGE
X100  TIME

PARAMETER 19.  MEAN    .2141 UNITS     .060  LOW     .168  HIGH     .280
PARAMETER 20.  MEAN    .0081 UNITS     .000  LOW     .000  HIGH     .008
PARAMETER 22.  MEAN    .3371 UNITS     .079  LOW     .258  HIGH     .419
PARAMETER 23.  MEAN   1.4521 UNITS     .499  LOW    1.653  HIGH    2.440
PARAMETER 24.  MEAN    .2141 UNITS     .116  LOW     .102  HIGH     .338
PARAMETER 25.  MEAN    .4101 UNITS     .000  LOW     .410  HIGH     .810
PARAMETER  2.  MEAN   5.5751 UNITS    1.594  LOW    3.941  HIGH    7.169
PARAMETER  3.  MEAN   9.4671 UNITS    4.334  LOW    4.133  HIGH   14.800
PARAMETER 29.  MEAN 281.833L UNITS  18.644  LOW  263.190  HIGH  300.477
PARAMETER 30.  MEAN  25.556L UNITS  10.167  LOW    6.388  HIGH   44.723
PARAMETER 31.  MEAN 174.500L UNITS  10.221  LOW  114.279  HIGH  134.721
PARAMETER 18.  MEAN   7.829L UNITS    .143  LOW    7.676  HIGH    7.982
PARAMETER 37.  MEAN 219.897L UNITS   8.982  LOW  210.915  HIGH  228.879
PARAMETER 36.  MEAN 236.412L UNITS   9.273  LOW  227.139  HIGH  245.685
PARAMETER 38.  MEAN  68.812L UNITS   7.678  LOW   68.135  HIGH   51.200
PARAMETER 39.  MEAN  23.765L UNITS    .919  LOW   22.846  HIGH   24.683
PARAMETER 41.  MEAN   6.035L UNITS   1.780  LOW    4.256  HIGH    7.815

PARAMETER 19.  MEAN      .215   MAX      .5200   MIN      .0340   VARIANCE      .019   SAMPLE SIZE  18.
PARAMETER 20.  MEAN      .000   MAX      .0000   MIN      .0000   VARIANCE      .000   SAMPLE SIZE   8.
PARAMETER 22.  MEAN      .337   MAX      .6400   MIN      .1260   VARIANCE      .025   SAMPLE SIZE  18.
PARAMETER 23.  MEAN     1.452   MAX     4.2800   MIN      .0000   VARIANCE     1.005   SAMPLE SIZE  18.
PARAMETER 24.  MEAN      .216   MAX      .6000   MIN      .0350   VARIANCE      .042   SAMPLE SIZE  18.
PARAMETER 25.  MEAN      .410   MAX      .4100   MIN      .0100   VARIANCE      .000   SAMPLE SIZE   1.
PARAMETER  2.  MEAN     5.575   MAX     9.0000   MIN     2.6000   VARIANCE     6.291   SAMPLE SIZE  14.
PARAMETER  3.  MEAN     9.467   MAX    32.5000   MIN     4.3000   VARIANCE   115.016   SAMPLE SIZE  14.
PARAMETER 29.  MEAN   281.833   MAX   389.0000   MIN   231.0000   VARIANCE  1405.323   SAMPLE SIZE  18.
PARAMETER 30.  MEAN    25.556   MAX   165.0000   MIN     2.0000   VARIANCE  1405.320   SAMPLE SIZE  18.
PARAMETER 31.  MEAN   174.500   MAX   145.0000   MIN    85.0000   VARIANCE   313.500   SAMPLE SIZE   8.
PARAMETER 18.  MEAN     7.829   MAX     8.3000   MIN     7.2000   VARIANCE      .088   SAMPLE SIZE  18.
PARAMETER 37.  MEAN   219.897   MAX   258.4550   MIN   181.3220   VARIANCE   284.237   SAMPLE SIZE  18.
PARAMETER 36.  MEAN   236.412   MAX   269.0000   MIN   208.0000   VARIANCE   325.257   SAMPLE SIZE  18.
PARAMETER 38.  MEAN    68.812   MAX    99.0000   MIN    38.0000   VARIANCE    21.429   SAMPLE SIZE  18.
PARAMETER 39.  MEAN    23.765   MAX    27.0000   MIN    21.0000   VARIANCE     3.191   SAMPLE SIZE  17.
PARAMETER 41.  MEAN     6.035   MAX    11.9000   MIN     1.6000   VARIANCE    11.080   SAMPLE SIZE  17.
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Table 31. Site 145 SUMMER

```
SITES                 155

YEAR                  72 TO  73
MONTH                  6      6
DAY                 NO RESTRAINT
HOUR                NO RESTRAINT

TYPE                NO RESTRAINT

BASIN               NO RESTRAINT
SUBBASIN            NO RESTRAINT
LOCATION            NO RESTRAINT

COUNTY              NO RESTRAINT
TOWNSHIP            NO RESTRAINT
LONGITUDE           NO RESTRAINT
LATITUDE            NO RESTRAINT

PARAMETER VALUE     NO RESTRAINT

DEPTH               NO RESTRAINT                    T TEST  (.05)

#19   SOLUBLE ORTHO PHOSPHORUS (MG/L)      PARAMETER 19.  MEAN      .287  UNITS      .062  LOW      .165  HIGH      .408
#20   TOTAL SOLUBLE PHOSPHORUS              PARAMETER 20.  MEAN      .000  UNITS      .000  LOW      .000  HIGH      .000
#22   TOTAL PHOSPHORUS                      PARAMETER 22.  MEAN      .369  UNITS      .046  LOW      .294  HIGH      .444
#23   KJELDAHL NITROGEN (MG/L)              PARAMETER 23.  MEAN     2.604  UNITS      .935  LOW     1.669  HIGH     3.539
#24   AMMONIA NITROGEN (MG/L)               PARAMETER 24.  MEAN      .306  UNITS      .155  LOW      .152  HIGH      .461
#25   NITRATE - NITROGEN (MG/L)             PARAMETER 25.  MEAN      .000  UNITS      .000  LOW      .000  HIGH      .000
#82   DISSOLVED OXYGEN                      PARAMETER  2.  MEAN     5.942  UNITS     1.701  LOW     4.240  HIGH     7.643
#83   TURBIDITY IN JACKSON UNITS            PARAMETER  3.  MEAN    10.306  UNITS     4.596  LOW     5.710  HIGH    14.902
#29   TOTAL DISSOLVED SOLIDS (MG/L)         PARAMETER 29.  MEAN   118.500  UNITS    23.833  LOW    94.667  HIGH   142.333
#30   TOTAL FILTERABLE SOLIDS (MG/L)        PARAMETER 30.  MEAN    17.500  UNITS    15.676  LOW     1.824  HIGH    33.176
#31   TOTAL VOLATILE SOLIDS (MG/L)          PARAMETER 31.  MEAN   160.200  UNITS    16.214  LOW   143.986  HIGH   176.414
#1A   PH LAB                                PARAMETER 18.  MEAN     7.906  UNITS      .178  LOW     7.727  HIGH     8.084
#37   HARDNESS FROM CA AND MG               PARAMETER 37.  MEAN   230.209  UNITS    29.069  LOW   201.140  HIGH   259.278
#38   ALKALINITY AS CACO3                   PARAMETER 38.  MEAN   256.471  UNITS    21.316  LOW   235.155  HIGH   277.786
#39   CALCIUM          MG/L                 PARAMETER 39.  MEAN    24.625  UNITS     4.152  LOW    20.034  HIGH    29.350
#40   MAGNESIUM        MG/L                  PARAMETER 41.  MEAN     9.553  UNITS     1.328  LOW    22.497  HIGH    26.343
#41   POTASSIUM        MG/L
#80   RIVER MILEAGE
#100  TIME

PARAMETER 19.  MEAN      .287   MAX      .4402  MIN      .0440  VARIANCE      .015  SAMPLE SIZE  10.
PARAMETER 20.  MEAN      .000   MAX      .0000  MIN      .0000  VARIANCE      .000  SAMPLE SIZE  10.
PARAMETER 22.  MEAN      .369   MAX      .5300  MIN      .1440  VARIANCE      .010  SAMPLE SIZE  10.
PARAMETER 23.  MEAN     2.604   MAX    10.0000  MIN     1.8200  VARIANCE     3.535  SAMPLE SIZE  10.
PARAMETER 24.  MEAN      .306   MAX     1.0000  MIN      .0550  VARIANCE      .091  SAMPLE SIZE  10.
PARAMETER 25.  MEAN      .000   MAX      .0000  MIN      .0000  VARIANCE      .000  SAMPLE SIZE  10.
PARAMETER  2.  MEAN     5.942   MAX     11.5000  MIN     3.5000  VARIANCE     7.933  SAMPLE SIZE  10.
PARAMETER  3.  MEAN    10.306   MAX     41.0000  MIN     1.5000  VARIANCE    85.312  SAMPLE SIZE  10.
PARAMETER 29.  MEAN   118.500   MAX    350.0000  MIN   245.0000  VARIANCE  2296.500  SAMPLE SIZE  10.
PARAMETER 30.  MEAN    17.500   MAX    143.0000  MIN     4.0000  VARIANCE   993.324  SAMPLE SIZE  10.
PARAMETER 31.  MEAN   160.200   MAX    208.0000  MIN   121.0000  VARIANCE   857.029  SAMPLE SIZE  10.
PARAMETER 18.  MEAN     7.906   MAX      8.0000  MIN     7.3000  VARIANCE      .129  SAMPLE SIZE  10.
PARAMETER 37.  MEAN   230.209   MAX    277.4160  MIN    66.0000  VARIANCE  2754.794  SAMPLE SIZE  10.
PARAMETER 38.  MEAN   256.471   MAX    337.0000  MIN   165.0000  VARIANCE  1718.660  SAMPLE SIZE  10.
PARAMETER 39.  MEAN    24.625   MAX     44.0000  MIN    26.0000  VARIANCE    93.896  SAMPLE SIZE  10.
PARAMETER 41.  MEAN     9.553   MAX     31.0000  MIN    19.0000  VARIANCE    10.517  SAMPLE SIZE  10.
                                  MAX     16.7000  MIN     1.6000  VARIANCE    25.031  SAMPLE SIZE  10.
```

Table 32. Site 155 SUMMER

SITES 160

YEAR 70 TO 73
MONTH 1 4 5 6 7
DAY NO RESTRAINT
HOUR NO RESTRAINT

TYPE NO RESTRAINT

BASIN NO RESTRAINT
SUBBASIN NO RESTRAINT
LOCATION NO RESTRAINT

COUNTY NO RESTRAINT
TOWNSHIP NO RESTRAINT
LONGITUDE NO RESTRAINT
LATITUDE NO RESTRAINT

PARAMETER VALUE NO RESTRAINT

DEPTH NO RESTRAINT

T TEST (.05)

X19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.195	LIMITS	.089	LOW	.106	HIGH	.284
X20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.248	LIMITS	.096	LOW	.151	HIGH	.344
X23	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	1.149	LIMITS	.140	LOW	1.009	HIGH	1.288
X24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.428	LIMITS	.117	LOW	.311	HIGH	.544
X25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.094	LIMITS	.020	LOW	.074	HIGH	.114
X02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	4.762	LIMITS	.968	LOW	3.794	HIGH	5.730
X03	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	16.039	LIMITS	4.713	LOW	11.326	HIGH	20.752
X29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	328.132	LIMITS	14.508	LOW	313.624	HIGH	342.639
X30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	14.079	LIMITS	3.735	LOW	10.344	HIGH	17.813
X31	TOTAL VOLATIBLE SOLIDS (MG/L)	PARAMETER 31.	MEAN	136.652	LIMITS	10.485	LOW	126.167	HIGH	147.138
X18	PH LAB	PARAMETER 18.	MEAN	7.471	LIMITS	.129	LOW	7.342	HIGH	7.601
X37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	253.484	LIMITS	11.055	LOW	242.431	HIGH	264.542
X36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	274.226	LIMITS	9.266	LOW	264.960	HIGH	283.492
X38	CALCIUM MG/L	PARAMETER 38.	MEAN	65.429	LIMITS	3.664	LOW	61.764	HIGH	69.093
X39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	21.897	LIMITS	.834	LOW	21.062	HIGH	22.731
X41	POTASSIUM MG/L	PARAMETER 41.	MEAN	3.486	LIMITS	.651	LOW	2.835	HIGH	4.137
X99	RIVER MILEAGE									
X100	TIME									

PARAMETER 19.	MEAN	.195	MAX	1.4000	MIN	.0050	VARIANCE	.082	SAMPLE SIZE	42.
PARAMETER 20.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	8.
PARAMETER 22.	MEAN	.248	MAX	1.4500	MIN	.0330	VARIANCE	.093	SAMPLE SIZE	41.
PARAMETER 23.	MEAN	1.149	MAX	3.2000	MIN	.4000	VARIANCE	.182	SAMPLE SIZE	38.
PARAMETER 24.	MEAN	.428	MAX	1.9700	MIN	.0400	VARIANCE	.130	SAMPLE SIZE	39.
PARAMETER 25.	MEAN	.094	MAX	.1600	MIN	.0600	VARIANCE	.001	SAMPLE SIZE	10.
PARAMETER 2.	MEAN	4.762	MAX	11.2000	MIN	.9000	VARIANCE	6.477	SAMPLE SIZE	29.
PARAMETER 3.	MEAN	16.039	MAX	39.0000	MIN	.5000	VARIANCE	166.169	SAMPLE SIZE	31.
PARAMETER 29.	MEAN	328.132	MAX	499.0000	MIN	259.0000	VARIANCE	1962.982	SAMPLE SIZE	34.
PARAMETER 30.	MEAN	14.079	MAX	55.0000	MIN	2.0000	VARIANCE	130.075	SAMPLE SIZE	38.
PARAMETER 31.	MEAN	136.652	MAX	169.0000	MIN	75.0000	VARIANCE	487.873	SAMPLE SIZE	23.
PARAMETER 18.	MEAN	7.471	MAX	8.7000	MIN	7.0000	VARIANCE	.141	SAMPLE SIZE	35.
PARAMETER 37.	MEAN	253.484	MAX	315.1450	MIN	193.9440	VARIANCE	812.747	SAMPLE SIZE	28.
PARAMETER 36.	MEAN	274.226	MAX	311.0000	MIN	199.0000	VARIANCE	642.247	SAMPLE SIZE	31.
PARAMETER 38.	MEAN	65.429	MAX	85.0000	MIN	47.0000	VARIANCE	89.291	SAMPLE SIZE	28.
PARAMETER 39.	MEAN	21.897	MAX	26.0000	MIN	18.0000	VARIANCE	4.810	SAMPLE SIZE	29.
PARAMETER 41.	MEAN	3.486	MAX	9.0000	MIN	.1000	VARIANCE	2.928	SAMPLE SIZE	29.

Table 33. Site 160 SUMMER

SITES 160

YEAR 70 TO 73
MONTH 8
DAY 10
HOUR NO RESTRAINT
NO RESTRAINT

TYPE NO RESTRAINT

BASIN NO RESTRAINT
SUBBASIN NO RESTRAINT
LOCATION NO RESTRAINT

COUNTY NO RESTRAINT
TOWNSHIP NO RESTRAINT
LONGITUDE NO RESTRAINT
LATITUDE NO RESTRAINT

PARAMETER VALUE NO RESTRAINT

DEPTH NO RESTRAINT

T TEST (.05)

X19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.118	UNITS	.078	LOW	.040	HIGH	.196
X20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.080	UNITS	.000	LOW	.000	HIGH	.080
X22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.320	UNITS	.081	LOW	.238	HIGH	.401
X23	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	1.541	UNITS	.201	LOW	1.340	HIGH	1.743
X24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.335	UNITS	.196	LOW	.139	HIGH	.531
X25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.110	UNITS	.181	LOW	-.271	HIGH	.491
X02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	3.107	UNITS	.786	LOW	2.321	HIGH	3.893
X03	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	16.360	UNITS	11.571	LOW	4.789	HIGH	27.931
X29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	331.214	UNITS	22.930	LOW	308.275	HIGH	354.153
X30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	16.957	UNITS	6.221	LOW	10.636	HIGH	23.078
X31	TOTAL VOLATIBLE SOLIDS (MG/L)	PARAMETER 31.	MEAN	157.750	UNITS	15.004	LOW	142.746	HIGH	172.754
X14	PH LAB	PARAMETER 14.	MEAN	7.356	UNITS	.189	LOW	7.167	HIGH	7.544
X37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	274.518	UNITS	22.851	LOW	251.666	HIGH	297.369
X36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	303.400	UNITS	63.081	LOW	240.319	HIGH	366.481
X38	CALCIUM MG/L	PARAMETER 38.	MEAN	67.462	UNITS	6.119	LOW	61.343	HIGH	73.580
X39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	25.706	UNITS	1.989	LOW	23.716	HIGH	27.695
X41	POTASSIUM MG/L	PARAMETER 41.	MEAN	4.153	UNITS	.461	LOW	3.692	HIGH	4.614
X99	RIVER MILEAGE									
X100	TIME									

PARAMETER 19.	MEAN	.118	MAX	.6190	MIN	.0040	VARIANCE	.023	SAMPLE SIZE	17.
PARAMETER 20.	MEAN	.080	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 22.	MEAN	.320	MAX	.6350	MIN	.0340	VARIANCE	.023	SAMPLE SIZE	16.
PARAMETER 23.	MEAN	1.541	MAX	2.7800	MIN	1.0800	VARIANCE	.143	SAMPLE SIZE	16.
PARAMETER 24.	MEAN	.335	MAX	1.4300	MIN	.0500	VARIANCE	.135	SAMPLE SIZE	16.
PARAMETER 25.	MEAN	.110	MAX	.1480	MIN	.0800	VARIANCE	.002	SAMPLE SIZE	2.
PARAMETER 2.	MEAN	3.107	MAX	6.7000	MIN	1.4000	VARIANCE	2.014	SAMPLE SIZE	15.
PARAMETER 3.	MEAN	16.360	MAX	50.0000	MIN	.3000	VARIANCE 261.656		SAMPLE SIZE	16.
PARAMETER 29.	MEAN	331.214	MAX	386.0000	MIN	255.0000	VARIANCE 1578.950		SAMPLE SIZE	14.
PARAMETER 30.	MEAN	16.957	MAX	52.0000	MIN	10.0000	VARIANCE 116.132		SAMPLE SIZE	14.
PARAMETER 31.	MEAN	157.750	MAX	196.0000	MIN	127.0000	VARIANCE 557.659		SAMPLE SIZE	12.
PARAMETER 14.	MEAN	7.356	MAX	7.6000	MIN	7.0000	VARIANCE .060		SAMPLE SIZE	9.
PARAMETER 37.	MEAN	274.518	MAX	351.4480	MIN	216.2800	VARIANCE 1431.038		SAMPLE SIZE	13.
PARAMETER 36.	MEAN	303.400	MAX	382.0000	MIN	241.0000	VARIANCE 2581.800		SAMPLE SIZE	5.
PARAMETER 38.	MEAN	67.462	MAX	88.0000	MIN	51.0000	VARIANCE 102.603		SAMPLE SIZE	13.
PARAMETER 39.	MEAN	25.706	MAX	32.0000	MIN	20.0000	VARIANCE 14.971		SAMPLE SIZE	13.
PARAMETER 41.	MEAN	4.153	MAX	4.9000	MIN	2.3000	VARIANCE .803		SAMPLE SIZE	17.

Table 34. Site 160 FALL

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Table 35. Site 200 SUMMER

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SITES                 210

YEAR                    70 TO  73
MONTH                    3     4          5     6     7
DAY                   NO RESTRAINT
HOUR                  NO RESTRAINT

TYPE                  NO RESTRAINT

BASIN                 NO RESTRAINT
SUBBASIN              NO RESTRAINT
LOCATION              NO RESTRAINT

AUTHORITY             NO RESTRAINT
TOWNSHIP              NO RESTRAINT
LONGITUDE             NO RESTRAINT
LATITUDE              NO RESTRAINT

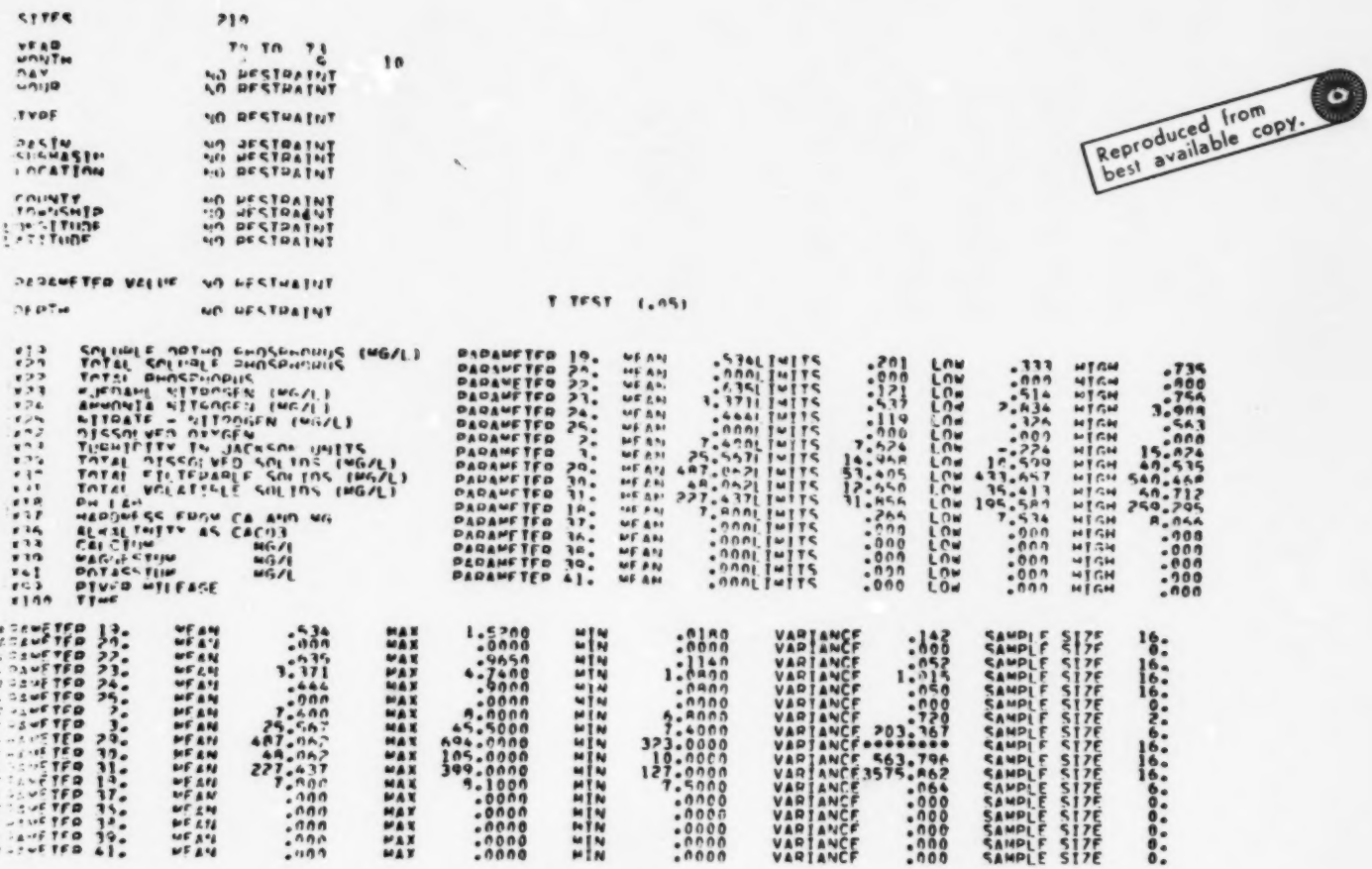
PARAMETER VALUE       NO RESTRAINT

DEPTH                 NO RESTRAINT                    T TEST  (.05)

 19   SOLUBLE ORTHO PHOSPHORUS (MG/L)   PARAMETER 19.  MEAN    .024 LIMITS    .014  LOW    .034  HIGH    .042
 20   TOTAL SOLUBLE PHOSPHORUS          PARAMETER 20.  MEAN    .000 LIMITS    .000  LOW    .000  HIGH    .000
 22   TOTAL PHOSPHORUS                  PARAMETER 22.  MEAN    .210 LIMITS    .148  LOW    .041  HIGH    .378
 23   KJEDAHL NITROGEN (MG/L)           PARAMETER 23.  MEAN   1.122 LIMITS    .304  LOW    .818  HIGH   1.426
 24   AMMONIA NITROGEN (MG/L)           PARAMETER 24.  MEAN    .164 LIMITS    .089  LOW    .076  HIGH    .253
 25   NITRATE - NITROGEN (MG/L)         PARAMETER 25.  MEAN    .000 LIMITS    .000  LOW    .000  HIGH    .000
 27   DISSOLVED OXYGEN                  PARAMETER  2.  MEAN   7.450 LIMITS   1.448  LOW   5.202  HIGH   9.698
 28   TURBIDITY IN JACKSON UNITS        PARAMETER  3.  MEAN  23.709 LIMITS  11.307  LOW  12.402  HIGH  35.014
 29   TOTAL DISSOLVED SOLIDS (MG/L)     PARAMETER 29.  MEAN 379.366 LIMITS  68.699  LOW 310.666  HIGH 448.063
 30   TOTAL FILTERABLE SOLIDS (MG/L)    PARAMETER 30.  MEAN 284.434 LIMITS  37.231  LOW -8.595  HIGH  66.867
 31   TOTAL VOLATILE SOLIDS (MG/L)      PARAMETER 31.  MEAN 140.000 LIMITS  25.243  LOW 114.757  HIGH 165.243
 18   PH LAB                            PARAMETER 18.  MEAN   8.091 LIMITS    .082  LOW   8.009  HIGH   8.173
 37   HARDNESS FROM CA AND MG           PARAMETER 37.  MEAN 315.411 LIMITS 200.149  LOW 115.262  HIGH 515.552
 36   ALKALINITY AS CACO3               PARAMETER 36.  MEAN 301.000 LIMITS  86.096  LOW 214.904  HIGH 387.096
 10   CALCIUM          MG/L             PARAMETER 10.  MEAN  74.667 LIMITS  52.446  LOW  22.141  HIGH 127.152
 13   MAGNESIUM        MG/L             PARAMETER 13.  MEAN  31.333 LIMITS  16.911  LOW  14.521  HIGH  44.244
 11   POTASSIUM        MG/L             PARAMETER 41.  MEAN   5.633 LIMITS   3.373  LOW   2.260  HIGH   9.006
 99   RIVER MILEAGE
100   TIME

PARAMETER 19.   MEAN     .024   MAX     .0810  MIN     .0070  VARIANCE     .000  SAMPLE SIZE   11.
PARAMETER 20.   MEAN     .000   MAX     .0000  MIN     .0000  VARIANCE     .000  SAMPLE SIZE    0.
PARAMETER 22.   MEAN     .210   MAX     .5400  MIN     .0440  VARIANCE     .063  SAMPLE SIZE   11.
PARAMETER 23.   MEAN    1.122   MAX    2.0000  MIN     .5800  VARIANCE     .205  SAMPLE SIZE   11.
PARAMETER 24.   MEAN     .164   MAX     .4500  MIN     .0300  VARIANCE     .018  SAMPLE SIZE   11.
PARAMETER 25.   MEAN     .000   MAX     .0000  MIN     .0000  VARIANCE     .000  SAMPLE SIZE    0.
PARAMETER  2.   MEAN    7.450   MAX    9.1000  MIN    5.0000  VARIANCE    1.903  SAMPLE SIZE   11.
PARAMETER  3.   MEAN   23.709   MAX   59.0000  MIN    6.0000  VARIANCE  283.307  SAMPLE SIZE   11.
PARAMETER 29.   MEAN  379.366   MAX  609.0000  MIN  300.0000  VARIANCE********  SAMPLE SIZE   11.
PARAMETER 30.   MEAN  284.434   MAX  486.0000  MIN    3.0000  VARIANCE 3071.655  SAMPLE SIZE   11.
PARAMETER 31.   MEAN  140.000   MAX  715.0000  MIN  102.0000  VARIANCE 1417.000  SAMPLE SIZE   11.
PARAMETER 18.   MEAN    8.091   MAX    8.2000  MIN    7.9000  VARIANCE     .015  SAMPLE SIZE   11.
PARAMETER 37.   MEAN  315.411   MAX  407.7270  MIN  259.3330  VARIANCE 2490.126  SAMPLE SIZE    3.
PARAMETER 36.   MEAN  301.000   MAX  341.0000  MIN  280.0000  VARIANCE 1201.000  SAMPLE SIZE    3.
PARAMETER 10.   MEAN   74.667   MAX   99.0000  MIN   61.0000  VARIANCE  446.333  SAMPLE SIZE    3.
PARAMETER 13.   MEAN   31.333   MAX   39.0000  MIN   26.0000  VARIANCE   46.333  SAMPLE SIZE    3.
PARAMETER 41.   MEAN    5.633   MAX    7.2000  MIN    4.8000  VARIANCE    1.843  SAMPLE SIZE    3.
```

Table 36. Site 210 SUMMER



SITES 210

YEAR 70 TO 71

MONTH 10

DAY NO RESTRAINT

HOUR NO RESTRAINT

TYPE NO RESTRAINT

BASIN NO RESTRAINT

SUBBASIN NO RESTRAINT

LOCATION NO RESTRAINT

COUNTY NO RESTRAINT

TOWNSHIP NO RESTRAINT

LONGITUDE NO RESTRAINT

LATITUDE NO RESTRAINT

PARAMETER VALUE NO RESTRAINT

DEPTH NO RESTRAINT

T TEST (.05)

610	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.534	LIMITS	.201	LOW	.333	HIGH	.735	
620	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.0000	LIMITS	.000	LOW	.000	HIGH	.000	
625	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.635	LIMITS	.121	LOW	.514	HIGH	.754	
630	KJELDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	3.371	LIMITS	.437	LOW	2.434	HIGH	3.908	
636	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.444	LIMITS	.119	LOW	.324	HIGH	.563	
665	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.0000	LIMITS	.000	LOW	.000	HIGH	.000	
300	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	7.4000	LIMITS	7.424	LOW	-.224	HIGH	15.024	
010	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	25.5673	LIMITS	14.948	LOW	10.599	HIGH	40.535	
530	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	487.0042	LIMITS	53.405	LOW	433.457	HIGH	540.448	
515	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	48.0042	LIMITS	12.450	LOW	35.413	HIGH	60.712	
535	TOTAL VOLATILE SOLIDS (MG/L)	PARAMETER 31.	MEAN	227.4371	LIMITS	31.456	LOW	195.581	HIGH	259.295	
010	PH (FA)	PARAMETER 18.	MEAN	7.8000	LIMITS	.244	LOW	7.556	HIGH	8.044	
927	HARDNESS FROM CA AND MG	PARAMETER 27.	MEAN	.0000	LIMITS	.000	LOW	.000	HIGH	.000	
936	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	.0000	LIMITS	.000	LOW	.000	HIGH	.000	
928	CALCIUM MG/L	PARAMETER 28.	MEAN	.0000	LIMITS	.000	LOW	.000	HIGH	.000	
929	MAGNESIUM MG/L	PARAMETER 29.	MEAN	.0000	LIMITS	.000	LOW	.000	HIGH	.000	
961	POTASSIUM MG/L	PARAMETER 41.	MEAN	.0000	LIMITS	.000	LOW	.000	HIGH	.000	
000	DAILY MILEAGE										
6100	TIME										

PARAMETER 19.	MEAN	.534	MAX	1.5200	MIN	.0180	VARIANCE	.142	SAMPLE SIZE	16.	
PARAMETER 20.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.	
PARAMETER 22.	MEAN	.635	MAX	.9650	MIN	.1140	VARIANCE	.052	SAMPLE SIZE	16.	
PARAMETER 23.	MEAN	3.371	MAX	4.7400	MIN	1.0800	VARIANCE	1.015	SAMPLE SIZE	16.	
PARAMETER 24.	MEAN	.444	MAX	.9000	MIN	.0000	VARIANCE	.050	SAMPLE SIZE	16.	
PARAMETER 25.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.	
PARAMETER 2.	MEAN	7.400	MAX	8.0000	MIN	6.8000	VARIANCE	.720	SAMPLE SIZE	2.	
PARAMETER 3.	MEAN	25.567	MAX	45.5000	MIN	7.4000	VARIANCE	203.767	SAMPLE SIZE	6.	
PARAMETER 29.	MEAN	487.042	MAX	694.0000	MIN	323.0000	VARIANCE	*********	SAMPLE SIZE	16.	
PARAMETER 30.	MEAN	48.042	MAX	105.0000	MIN	10.0000	VARIANCE	563.796	SAMPLE SIZE	16.	
PARAMETER 31.	MEAN	227.437	MAX	399.0000	MIN	127.0000	VARIANCE	3575.862	SAMPLE SIZE	16.	
PARAMETER 18.	MEAN	7.800	MAX	9.1000	MIN	7.5000	VARIANCE	.064	SAMPLE SIZE	6.	
PARAMETER 27.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.	
PARAMETER 36.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.	
PARAMETER 28.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.	
PARAMETER 29.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.	
PARAMETER 41.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.	

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Table 37. Site 210 FALL

STYPE 215

YEAR 71 TO 73
MONTH 1 4 5 6 7
DAY NO RESTRAINT
HOUR NO RESTRAINT

TYOF NO RESTRAINT

BASIN NO RESTRAINT
SUBBASIN NO RESTRAINT
LOCATION NO RESTRAINT

COUNTY NO RESTRAINT
TOWNSHIP NO RESTRAINT
LONGITUDE NO RESTRAINT
LATITUDE NO RESTRAINT

PARAMETER VALUE NO RESTRAINT Y TEST (.05)

DEPTH NO RESTRAINT

Y19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.718	UNITS	.480	LOW	.300	HIGH	1.127
Y20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.000	UNITS	.000	LOW	.000	HIGH	.000
Y22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.931	UNITS	.481	LOW	.451	HIGH	1.417
Y23	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	4.427	UNITS	1.035	LOW	1.394	HIGH	5.454
Y24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.602	UNITS	.223	LOW	.181	HIGH	.824
Y25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.000	UNITS	.000	LOW	.000	HIGH	.000
X02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	9.600	UNITS	4.052	LOW	2.548	HIGH	16.652
X03	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	11.767	UNITS	5.741	LOW	4.025	HIGH	17.507
Y29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	496.000	UNITS	55.797	LOW	448.203	HIGH	551.797
Y30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	13.444	UNITS	13.534	LOW	5.910	HIGH	32.979
Y31	TOTAL VOLATILE SOLIDS (MG/L)	PARAMETER 31.	MEAN	237.778	UNITS	43.071	LOW	194.707	HIGH	280.848
Y14	PH (-LOG H+)	PARAMETER 14.	MEAN	8.000	UNITS	.142	LOW	7.887	HIGH	8.271
Y17	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	312.987	UNITS	44.314	LOW	268.673	HIGH	357.300
Y36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	320.500	UNITS	27.111	LOW	293.389	HIGH	348.020
Y38	CALCIUM MG/L	PARAMETER 38.	MEAN	61.333	UNITS	9.026	LOW	52.307	HIGH	70.427
Y39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	37.625	UNITS	4.005	LOW	33.620	HIGH	41.720
Y41	POTASSIUM MG/L	PARAMETER 41.	MEAN	11.650	UNITS	2.188	LOW	9.462	HIGH	13.838
Y00	RIVER MILEAGE										
X100	TIME										

PARAMETER 19.	MEAN	.718	MAX	1.5600	MIN	.3350	VARIANCE	.239	SAMPLE SIZE	8.
PARAMETER 20.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	8.
PARAMETER 22.	MEAN	.931	MAX	2.2000	MIN	.3100	VARIANCE	.391	SAMPLE SIZE	9.
PARAMETER 23.	MEAN	4.427	MAX	6.6800	MIN	2.7000	VARIANCE	1.799	SAMPLE SIZE	9.
PARAMETER 24.	MEAN	.602	MAX	.9700	MIN	.1000	VARIANCE	.083	SAMPLE SIZE	9.
PARAMETER 25.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	8.
PARAMETER 2.	MEAN	9.600	MAX	9.8000	MIN	4.5000	VARIANCE	6.487	SAMPLE SIZE	4.
PARAMETER 3.	MEAN	11.767	MAX	21.0000	MIN	2.5000	VARIANCE	55.775	SAMPLE SIZE	9.
PARAMETER 29.	MEAN	496.000	MAX	611.0000	MIN	394.0000	VARIANCE	5260.250	SAMPLE SIZE	9.
PARAMETER 30.	MEAN	13.444	MAX	52.0000	MIN	5.0000	VARIANCE	310.028	SAMPLE SIZE	9.
PARAMETER 31.	MEAN	237.778	MAX	331.0000	MIN	152.0000	VARIANCE	3139.694	SAMPLE SIZE	9.
PARAMETER 14.	MEAN	8.000	MAX	8.4000	MIN	7.7000	VARIANCE	.056	SAMPLE SIZE	9.
PARAMETER 37.	MEAN	312.987	MAX	355.8940	MIN	248.3300	VARIANCE	1782.812	SAMPLE SIZE	6.
PARAMETER 36.	MEAN	320.500	MAX	391.0000	MIN	271.0000	VARIANCE	1428.691	SAMPLE SIZE	11.
PARAMETER 38.	MEAN	61.333	MAX	71.0000	MIN	50.0000	VARIANCE	75.067	SAMPLE SIZE	6.
PARAMETER 39.	MEAN	37.625	MAX	44.0000	MIN	30.0000	VARIANCE	23.982	SAMPLE SIZE	8.
PARAMETER 41.	MEAN	11.650	MAX	13.6000	MIN	6.8000	VARIANCE	6.946	SAMPLE SIZE	8.

Table 38. Site 215 SUMMER

SITES 220

YEAR 70 TO 71

MONTH 9 9 10

DAY NO RESTRICTION

HOUR NO RESTRICTION

TYPE NO RESTRICTION

T TEST (.05)

X19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.075	LIMITS	.448	LOW	.536	HIGH	1.415
X20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.987	LIMITS	.322	LOW	.464	HIGH	1.380
X23	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	4.183	LIMITS	.522	LOW	3.499	HIGH	4.424
X24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.598	LIMITS	.476	LOW	-.077	HIGH	1.274
X25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X03	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	473.600	LIMITS	85.540	LOW	388.060	HIGH	559.140
X30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	86.667	LIMITS	42.485	LOW	44.182	HIGH	129.152
X31	TOTAL VOLATILE SOLIDS (MG/L)	PARAMETER 31.	MEAN	215.700	LIMITS	15.151	LOW	188.547	HIGH	242.853
X19	PH L=0	PARAMETER 19.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	316.900	LIMITS	69.992	LOW	246.914	HIGH	386.886
X36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X39	CALCIUM MG/L	PARAMETER 39.	MEAN	71.286	LIMITS	6.082	LOW	65.204	HIGH	79.367
X38	MAGNESIUM MG/L	PARAMETER 38.	MEAN	30.667	LIMITS	4.892	LOW	25.775	HIGH	35.558
X41	POTASSIUM MG/L	PARAMETER 41.	MEAN	5.310	LIMITS	.878	LOW	4.432	HIGH	6.188
X00	OTHER WELFARE									
X100	TYME									

PARAMETER 19.	MEAN	.975	MAX	1.5640	MIN	.4480	VARIANCE	.226	SAMPLE SIZE	7.
PARAMETER 20.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	8.
PARAMETER 22.	MEAN	.987	MAX	1.4000	MIN	.2040	VARIANCE	.149	SAMPLE SIZE	8.
PARAMETER 23.	MEAN	4.183	MAX	6.9000	MIN	3.1000	VARIANCE	.532	SAMPLE SIZE	10.
PARAMETER 24.	MEAN	.598	MAX	2.9000	MIN	.0450	VARIANCE	.891	SAMPLE SIZE	10.
PARAMETER 25.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 2.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 3.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 29.	MEAN	473.600	MAX	719.0000	MIN	388.0000	VARIANCE********		SAMPLE SIZE	10.
PARAMETER 30.	MEAN	86.667	MAX	195.0000	MIN	30.0000	VARIANCE	3057.750	SAMPLE SIZE	9.
PARAMETER 31.	MEAN	215.700	MAX	333.0000	MIN	172.0000	VARIANCE	2415.122	SAMPLE SIZE	10.
PARAMETER 19.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 37.	MEAN	316.900	MAX	386.7360	MIN	247.7020	VARIANCE	2268.565	SAMPLE SIZE	6.
PARAMETER 36.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 39.	MEAN	71.286	MAX	84.0000	MIN	66.0000	VARIANCE	43.238	SAMPLE SIZE	7.
PARAMETER 38.	MEAN	30.667	MAX	43.0000	MIN	24.0000	VARIANCE	48.500	SAMPLE SIZE	9.
PARAMETER 41.	MEAN	5.310	MAX	7.6000	MIN	3.8000	VARIANCE	1.508	SAMPLE SIZE	10.

Table 39. Site 220 FALL

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SITES              300

YEAR               70 TO 73
MONTH               3    4     5     6     7
DAY              NO RESTRAINT
HOUR             NO RESTRAINT

TYPE             NO RESTRAINT

BASIN            NO RESTRAINT
SUBBASIN         NO RESTRAINT
LOCATION         NO RESTRAINT

COUNTY           NO RESTRAINT
TOWNSHIP         NO RESTRAINT
LONGITUDE        NO RESTRAINT
LATITUDE         NO RESTRAINT

PARAMETER VALUE  NO RESTRAINT

DEPTH            NO RESTRAINT                    T TEST  (.05)

X19   SOLUBLE ORTHO PHOSPHORUS (MG/L)   PARAMETER 19.  MEAN    .031 LIMITS    .000 LOW    .022 HIGH    .039
X20   TOTAL SOLUBLE PHOSPHORUS          PARAMETER 20.  MEAN    .094 LIMITS    .000 LOW    .000 HIGH    .000
X22   TOTAL PHOSPHORUS                  PARAMETER 22.  MEAN    .098 LIMITS    .014 LOW    .082 HIGH    .114
X23   KJEDAHL NITROGEN (MG/L)           PARAMETER 23.  MEAN    .774 LIMITS    .125 LOW    .449 HIGH    .999
X24   AMMONIA NITROGEN (MG/L)           PARAMETER 24.  MEAN    .264 LIMITS    .082 LOW    .182 HIGH    .345
X25   NITRATE - NITROGEN (MG/L)         PARAMETER 25.  MEAN    .000 LIMITS    .000 LOW    .000 HIGH    .000
X02   DISSOLVED OXYGEN                  PARAMETER  2.  MEAN   9.216 LIMITS   1.163 LOW   8.073 HIGH  10.359
X03   TURBIDITY IN JACKSON UNITS        PARAMETER  3.  MEAN   6.168 LIMITS   1.871 LOW   4.297 HIGH   8.039
X29   TOTAL DISSOLVED SOLIDS (MG/L)     PARAMETER 29.  MEAN 259.635 LIMITS   9.539 LOW 250.097 HIGH 269.174
X30   TOTAL FILTERABLE SOLIDS (MG/L)    PARAMETER 30.  MEAN  13.606 LIMITS   3.817 LOW   9.789 HIGH  17.423
X31   TOTAL VOLATILE SOLIDS (MG/L)      PARAMETER 31.  MEAN 111.474 LIMITS  13.313 LOW  98.161 HIGH 124.786
X18   PH LAB                            PARAMETER 18.  MEAN   8.004 LIMITS    .096 LOW   7.910 HIGH   8.099
X37   HARDNESS FROM CA AND MG           PARAMETER 37.  MEAN 210.617 LIMITS   8.108 LOW 202.509 HIGH 218.725
X36   ALKALINITY AS CACO3               PARAMETER 36.  MEAN 214.824 LIMITS  10.290 LOW 204.534 HIGH 225.113
X38   CALCIUM          MG/L             PARAMETER 38.  MEAN  49.775 LIMITS   2.423 LOW  47.356 HIGH  52.201
X39   MAGNESIUM        MG/L             PARAMETER 39.  MEAN  21.103 LIMITS   1.024 LOW  20.078 HIGH  22.127
X41   POTASSIUM        MG/L             PARAMETER 41.  MEAN   3.303 LIMITS    .442 LOW   2.860 HIGH   3.745
X99   RIVER MILEAGE
X100  TIME

PARAMETER 19.   MEAN     .031   MAX     .1360   MIN     .0050   VARIANCE    .001   SAMPLE SIZE  38.
PARAMETER 20.   MEAN     .094   MAX     .0980   MIN     .0980   VARIANCE    .000   SAMPLE SIZE   1.
PARAMETER 22.   MEAN     .098   MAX     .2750   MIN     .0300   VARIANCE    .002   SAMPLE SIZE  40.
PARAMETER 23.   MEAN     .774   MAX    2.5600   MIN     .3400   VARIANCE    .153   SAMPLE SIZE  40.
PARAMETER 24.   MEAN     .264   MAX     .8400   MIN     .0100   VARIANCE    .056   SAMPLE SIZE  35.
PARAMETER 25.   MEAN     .000   MAX     .0050   MIN     .0000   VARIANCE    .000   SAMPLE SIZE   0.
PARAMETER  2.   MEAN    9.216   MAX   17.2000   MIN    4.6000   VARIANCE   7.661   SAMPLE SIZE  25.
PARAMETER  3.   MEAN    6.168   MAX   19.0000   MIN    .7000   VARIANCE  20.549   SAMPLE SIZE  25.
PARAMETER 29.   MEAN  259.635   MAX  304.0000   MIN  182.0000   VARIANCE 924.414   SAMPLE SIZE  33.
PARAMETER 30.   MEAN   13.606   MAX   51.0000   MIN    4.0000   VARIANCE 115.996   SAMPLE SIZE  33.
PARAMETER 31.   MEAN  111.474   MAX  195.0000   MIN   84.0000   VARIANCE 762.819   SAMPLE SIZE  33.
PARAMETER 18.   MEAN    8.004   MAX    8.5000   MIN    7.5000   VARIANCE    .048   SAMPLE SIZE  23.
PARAMETER 37.   MEAN  210.617   MAX  256.6990   MIN  153.1140   VARIANCE 580.887   SAMPLE SIZE  36.
PARAMETER 36.   MEAN  214.824   MAX  250.0000   MIN  136.0000   VARIANCE 468.695   SAMPLE SIZE  34.
PARAMETER 38.   MEAN   49.775   MAX   63.0000   MIN   30.0000   VARIANCE  51.892   SAMPLE SIZE  36.
PARAMETER 39.   MEAN   21.103   MAX   29.0000   MIN   13.0000   VARIANCE  10.042   SAMPLE SIZE  39.
PARAMETER 41.   MEAN    3.303   MAX    8.7000   MIN    2.8000   VARIANCE   1.826   SAMPLE SIZE  38.
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Table 40. Site 300 SUMMER

SITES 300

YEAR 70 TO 73
MONTH 8 8 10
DAY NO RESTRAINT
HOUR NO RESTRAINT

TYPE NO RESTRAINT

BASIN NO RESTRAINT
SUBBASIN NO RESTRAINT
LOCATION NO RESTRAINT

COUNTY NO RESTRAINT
TOWNSHIP NO RESTRAINT
LONGITUDE NO RESTRAINT
LATITUDE NO RESTRAINT

PARAMETER VALUE NO RESTRAINT

DEPTH NO RESTRAINT

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T TEST (.05)

X19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.170	LIMITS	.055	LOW	.114	HIGH	.225
X20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.339	LIMITS	.095	LOW	.244	HIGH	.434
X23	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	1.341	LIMITS	.245	LOW	1.096	HIGH	1.586
X24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.269	LIMITS	.089	LOW	.180	HIGH	.358
X25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	7.900	LIMITS	2.291	LOW	5.609	HIGH	10.191
X03	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	13.700	LIMITS	13.816	LOW	-.116	HIGH	27.516
X29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	297.640	LIMITS	19.365	LOW	278.275	HIGH	317.005
X30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	35.520	LIMITS	13.279	LOW	22.241	HIGH	48.799
X31	TOTAL VOLATILE SOLIDS (MG/L)	PARAMETER 31.	MEAN	134.773	LIMITS	12.139	LOW	122.634	HIGH	146.912
X18	PH LAB	PARAMETER 18.	MEAN	8.043	LIMITS	.206	LOW	7.837	HIGH	8.249
X37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	232.059	LIMITS	10.822	LOW	221.237	HIGH	242.881
X36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	215.333	LIMITS	27.117	LOW	188.216	HIGH	242.450
X38	CALCIUM MG/L	PARAMETER 38.	MEAN	52.619	LIMITS	2.859	LOW	49.760	HIGH	55.478
X39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	24.792	LIMITS	1.155	LOW	23.637	HIGH	25.946
X41	POTASSIUM MG/L	PARAMETER 41.	MEAN	3.876	LIMITS	.511	LOW	3.365	HIGH	4.387
X99	RIVER MILEAGE									
X100	TIME									

PARAMETER 19.	MEAN	.170	MAX	.4800	MIN	.0100	VARIANCE	.014	SAMPLE SIZE 21.
PARAMETER 20.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE 0.
PARAMETER 22.	MEAN	.339	MAX	.6350	MIN	.0200	VARIANCE	.043	SAMPLE SIZE 21.
PARAMETER 23.	MEAN	1.341	MAX	2.4200	MIN	.3500	VARIANCE	.336	SAMPLE SIZE 24.
PARAMETER 24.	MEAN	.269	MAX	.6800	MIN	.0350	VARIANCE	.045	SAMPLE SIZE 24.
PARAMETER 25.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE 0.
PARAMETER 2.	MEAN	7.900	MAX	10.9000	MIN	6.0000	VARIANCE	3.405	SAMPLE SIZE 5.
PARAMETER 3.	MEAN	13.700	MAX	35.5000	MIN	3.3000	VARIANCE	173.268	SAMPLE SIZE 6.
PARAMETER 29.	MEAN	297.640	MAX	368.0000	MIN	213.0000	VARIANCE	2200.573	SAMPLE SIZE 25.
PARAMETER 30.	MEAN	35.520	MAX	140.0000	MIN	8.0000	VARIANCE	1034.863	SAMPLE SIZE 25.
PARAMETER 31.	MEAN	134.773	MAX	178.0000	MIN	91.0000	VARIANCE	749.327	SAMPLE SIZE 22.
PARAMETER 18.	MEAN	8.043	MAX	8.3000	MIN	7.7000	VARIANCE	.050	SAMPLE SIZE 7.
PARAMETER 37.	MEAN	232.059	MAX	269.1840	MIN	185.4380	VARIANCE	534.709	SAMPLE SIZE 20.
PARAMETER 36.	MEAN	215.333	MAX	249.0000	MIN	170.0000	VARIANCE	467.467	SAMPLE SIZE 6.
PARAMETER 38.	MEAN	52.619	MAX	65.0000	MIN	38.0000	VARIANCE	39.448	SAMPLE SIZE 21.
PARAMETER 39.	MEAN	24.792	MAX	29.0000	MIN	21.0000	VARIANCE	7.476	SAMPLE SIZE 24.
PARAMETER 41.	MEAN	3.876	MAX	6.0000	MIN	1.8000	VARIANCE	1.530	SAMPLE SIZE 25.

Table 41. Site 300 FALL

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SITES                400

YEAR                  70 TO  73
MONTH                  3      4       5       6       7
DAY                NO RESTRAINT
HOUR               NO RESTRAINT

TYPE               NO RESTRAINT

BASIN              NO RESTRAINT
SUBBASIN           NO RESTRAINT
LOCATION           NO RESTRAINT

COUNTY             NO RESTRAINT
TOWNSHIP           NO RESTRAINT
LONGITUDE          NO RESTRAINT
LATITUDE           NO RESTRAINT

PARAMETER VALUE    NO RESTRAINT                    T TEST  (.05)
DEPTH              NO RESTRAINT

X19   SOLUBLE ORTHO PHOSPHORUS (MG/L)    PARAMETER 19.  MEAN    .021LIMITS    .008  LOW    .021  HIGH    .036
X20   TOTAL SOLUBLE PHOSPHORUS           PARAMETER 20.  MEAN    .000LIMITS    .000  LOW    .000  HIGH    .000
X22   TOTAL PHOSPHORUS                   PARAMETER 22.  MEAN    .081LIMITS    .013  LOW    .068  HIGH    .095
X23   KJEDAHL NITROGEN (MG/L)            PARAMETER 23.  MEAN   1.088LIMITS    .056  LOW   1.032  HIGH   1.143
X24   AMMONIA NITROGEN (MG/L)            PARAMETER 24.  MEAN    .371LIMITS    .078  LOW    .293  HIGH    .449
X25   NITRATE - NITROGEN (MG/L)          PARAMETER 25.  MEAN    .089LIMITS    .040  LOW    .050  HIGH    .129
X02   DISSOLVED OXYGEN                   PARAMETER  2.  MEAN   6.609LIMITS    .957  LOW   5.652  HIGH   7.566
X03   TURBIDITY IN JACKSON UNITS         PARAMETER  3.  MEAN   4.331LIMITS   2.274  LOW   2.056  HIGH   6.605
X29   TOTAL DISSOLVED SOLIDS (MG/L)      PARAMETER 29.  MEAN 198.372LIMITS  13.110  LOW 185.262  HIGH 211.482
X30   TOTAL FILTERABLE SOLIDS (MG/L)     PARAMETER 30.  MEAN  10.930LIMITS   3.744  LOW   7.186  HIGH  14.674
X31   TOTAL VOLATILE SOLIDS (MG/L)       PARAMETER 31.  MEAN  84.781LIMITS   7.695  LOW  77.085  HIGH  92.478
X18   PH LAB                             PARAMETER 18.  MEAN   7.780LIMITS    .105  LOW   7.675  HIGH   7.885
X37   HARDNESS FROM CA AND MG            PARAMETER 37.  MEAN 157.260LIMITS   8.867  LOW 148.393  HIGH 166.127
X36   ALKALINITY AS CACO3                PARAMETER 36.  MEAN 161.622LIMITS  11.457  LOW 150.166  HIGH 173.079
X38   CALCIUM          MG/L              PARAMETER 38.  MEAN  39.061LIMITS   1.009  LOW  37.052  HIGH  41.071
X39   MAGNESIUM        MG/L              PARAMETER 39.  MEAN  14.577LIMITS   1.078  LOW  13.499  HIGH  15.655
X41   POTASSIUM        MG/L              PARAMETER 41.  MEAN   2.680LIMITS    .246  LOW   2.435  HIGH   2.926
X99   RIVER MILEAGE
X100  TIME

PARAMETER 19.   MEAN      .029   MAX      .1750   MIN      .0010   VARIANCE      .001   SAMPLE SIZE  51.
PARAMETER 20.   MEAN      .000   MAX      .0000   MIN      .0000   VARIANCE      .000   SAMPLE SIZE  40.
PARAMETER 22.   MEAN      .081   MAX      .2650   MIN      .0220   VARIANCE      .002   SAMPLE SIZE  51.
PARAMETER 23.   MEAN     1.088   MAX     1.4600   MIN      .7200   VARIANCE      .038   SAMPLE SIZE  40.
PARAMETER 24.   MEAN      .371   MAX     1.0000   MIN      .0300   VARIANCE      .067   SAMPLE SIZE  45.
PARAMETER 25.   MEAN      .089   MAX      .5800   MIN      .0100   VARIANCE      .011   SAMPLE SIZE  28.
PARAMETER  2.   MEAN     6.609   MAX    10.5000   MIN     3.0000   VARIANCE     4.654   SAMPLE SIZE  22.
PARAMETER  3.   MEAN     4.331   MAX    27.5000   MIN     1.0000   VARIANCE    45.703   SAMPLE SIZE  35.
PARAMETER 29.   MEAN   198.372   MAX   296.0000   MIN   122.0000   VARIANCE  1814.001   SAMPLE SIZE  43.
PARAMETER 30.   MEAN    10.930   MAX    69.0000   MIN     1.0000   VARIANCE   147.924   SAMPLE SIZE  43.
PARAMETER 31.   MEAN    84.781   MAX   130.0000   MIN    30.0000   VARIANCE   457.402   SAMPLE SIZE  32.
PARAMETER 18.   MEAN     7.780   MAX     8.4000   MIN     7.1000   VARIANCE      .121   SAMPLE SIZE  45.
PARAMETER 37.   MEAN   157.260   MAX   242.7320   MIN    69.7790   VARIANCE   945.545   SAMPLE SIZE  40.
PARAMETER 36.   MEAN   161.622   MAX   244.6000   MIN    94.2000   VARIANCE  1449.649   SAMPLE SIZE  45.
PARAMETER 38.   MEAN    39.061   MAX    56.0000   MIN    23.0000   VARIANCE    48.559   SAMPLE SIZE  49.
PARAMETER 39.   MEAN    14.577   MAX    25.0000   MIN     3.0000   VARIANCE    15.112   SAMPLE SIZE  52.
PARAMETER 41.   MEAN     2.680   MAX     4.7000   MIN     1.6000   VARIANCE      .681   SAMPLE SIZE  46.
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Table 42. Site 400 SUMMER

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SITES                 400

YEAR                   72 TO  73
MONTH                   6      8          10
DAY                NO RESTRAINT
HOUR               NO RESTRAINT

TYPE               NO RESTRAINT

BASIN              NO RESTRAINT
SUBBASIN           NO RESTRAINT
LOCATION           NO RESTRAINT

COUNTY             NO RESTRAINT
TOWNSHIP           NO RESTRAINT
LONGITUDE          NO RESTRAINT
LATITUDE           NO RESTRAINT

PARAMETER VALUE    NO RESTRAINT
DEPTH              NO RESTRAINT                    T TEST  (.05)

X19   SOLUBLE ORTHO PHOSPHORUS (MG/L)    PARAMETER 19.  MEAN     .025LIMITS     .012  LOW     .012  HIGH     .037
X20   TOTAL SOLUBLE PHOSPHORUS           PARAMETER 20.  MEAN     .020LIMITS     .009  LOW     .020  HIGH     .020
X22   TOTAL PHOSPHORUS                   PARAMETER 22.  MEAN     .081LIMITS     .048  LOW     .033  HIGH     .130
X23   KJEDAHL NITROGEN (MG/L)            PARAMETER 23.  MEAN    1.368LIMITS     .226  LOW    1.142  HIGH    1.594
X24   AMMONIA NITROGEN (MG/L)            PARAMETER 24.  MEAN     .530LIMITS     .100  LOW     .430  HIGH     .630
X25   NITRITE + NITRATE NITROGEN (MG/L)  PARAMETER 25.  MEAN     .105LIMITS     .073  LOW     .033  HIGH     .178
X02   DISSOLVED OXYGEN                   PARAMETER  2.  MEAN    5.860LIMITS   35.577  LOW  -29.777  HIGH   41.377
X03   TURBIDITY IN JACKSON UNITS         PARAMETER  3.  MEAN    1.340LIMITS    1.674  LOW    -.314  HIGH    3.034
X29   TOTAL DISSOLVED SOLIDS (MG/L)      PARAMETER 29.  MEAN  205.727LIMITS   11.365  LOW  194.362  HIGH  217.092
X30   TOTAL FILTERABLE SOLIDS (MG/L)     PARAMETER 30.  MEAN    9.455LIMITS    8.585  LOW    1.870  HIGH   17.039
X31   TOTAL VOLATILE SOLIDS (MG/L)       PARAMETER 31.  MEAN   96.500LIMITS    8.371  LOW   88.129  HIGH  104.871
X18   PH (-LOG)                          PARAMETER 18.  MEAN    7.656LIMITS     .262  LOW    7.427  HIGH    7.952
X47   HARDNESS FROM CA AND MG            PARAMETER 47.  MEAN  168.335LIMITS    8.098  LOW  160.237  HIGH  177.932
X36   ALKALINITY AS CACO3                PARAMETER 36.  MEAN  194.000LIMITS   16.434  LOW  141.566  HIGH  174.434
X38   CALCIUM          MG/L              PARAMETER 38.  MEAN   41.700LIMITS    2.998  LOW   38.702  HIGH   44.698
X39   MAGNESIUM        MG/L              PARAMETER 39.  MEAN   15.438LIMITS     .339  LOW   15.099  HIGH   15.975
X41   POTASSIUM        MG/L              PARAMETER 41.  MEAN    2.536LIMITS     .346  LOW    2.191  HIGH    2.882
X99   RIVER MILEAGE
X100  TIME

PARAMETER 19.  MEAN     .025   MAX     .0440   MIN     .0100   VARIANCE     .000   SAMPLE SIZE   9.
PARAMETER 20.  MEAN     .020   MAX     .0280   MIN     .0100   VARIANCE     .000   SAMPLE SIZE   9.
PARAMETER 22.  MEAN     .081   MAX     .1750   MIN     .0200   VARIANCE     .003   SAMPLE SIZE   7.
PARAMETER 23.  MEAN    1.368   MAX    2.1000   MIN     .5200   VARIANCE     .100   SAMPLE SIZE  10.
PARAMETER 24.  MEAN     .530   MAX     .7700   MIN     .2400   VARIANCE     .022   SAMPLE SIZE  11.
PARAMETER 25.  MEAN     .105   MAX     .1600   MIN     .0540   VARIANCE     .002   SAMPLE SIZE   4.
PARAMETER  2.  MEAN    5.860   MAX    8.6605   MIN    3.0000   VARIANCE   15.680   SAMPLE SIZE   2.
PARAMETER  3.  MEAN    1.340   MAX    3.5000   MIN     .6020   VARIANCE    1.818   SAMPLE SIZE   5.
PARAMETER 29.  MEAN  205.727   MAX  229.0000   MIN  174.0000   VARIANCE  286.218   SAMPLE SIZE  11.
PARAMETER 30.  MEAN    9.455   MAX   42.0000   MIN    1.0000   VARIANCE  127.473   SAMPLE SIZE  11.
PARAMETER 31.  MEAN   96.500   MAX  118.0000   MIN   62.0000   VARIANCE  136.944   SAMPLE SIZE  10.
PARAMETER 18.  MEAN    7.698   MAX    8.4000   MIN    7.1000   VARIANCE     .134   SAMPLE SIZE  10.
PARAMETER 47.  MEAN  168.334   MAX  190.2000   MIN  142.1000   VARIANCE  147.840   SAMPLE SIZE  10.
PARAMETER 36.  MEAN  194.000   MAX  177.0000   MIN  103.0000   VARIANCE  386.222   SAMPLE SIZE   8.
PARAMETER 38.  MEAN   41.700   MAX   49.6000   MIN   33.0000   VARIANCE   17.511   SAMPLE SIZE  10.
PARAMETER 39.  MEAN   15.536   MAX   16.6000   MIN   15.0000   VARIANCE     .253   SAMPLE SIZE  11.
PARAMETER 41.  MEAN    2.536   MAX    3.9000   MIN    1.6000   VARIANCE     .255   SAMPLE SIZE  11.
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Table 43. Site 400 FALL

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SITES                405

YEAR                 70 10  73
MONTH                 A      S
DAY                NO RESTRAINT
HOUR               NO RESTRAINT

TYPE               NO RESTRAINT

BASIN              NO RESTRAINT
SUBBASIN           NO RESTRAINT
LOCATION           NO RESTRAINT

COUNTY             NO RESTRAINT
TOWNSHIP           NO RESTRAINT
LONGITUDE          NO RESTRAINT
LATITUDE           NO RESTRAINT

PARAMETER VALUE    NO RESTRAINT

DEPTH              NO RESTRAINT                    T TEST (.05)

X19   SOLUBLE ORTHO PHOSPHORUS (MG/L)     PARAMETER 19.  MEAN     .024LIMITS     .010  LOW     .014  HIGH     .034
X20   TOTAL SOLUBLE PHOSPHORUS            PARAMETER 20.  MEAN     .030LIMITS     .000  LOW     .000  HIGH     .080
X22   TOTAL PHOSPHORUS                    PARAMETER 22.  MEAN     .076LIMITS     .017  LOW     .045  HIGH     .088
X23   KJEDAHL NITROGEN (MG/L)             PARAMETER 23.  MEAN    1.467LIMITS     .165  LOW    1.302  HIGH    1.633
X24   AMMONIA NITROGEN (MG/L)             PARAMETER 24.  MEAN     .521LIMITS     .136  LOW     .385  HIGH     .657
X25   NITRATE - NITROGEN (MG/L)           PARAMETER 25.  MEAN     .132LIMITS     .062  LOW     .070  HIGH     .193
X02   DISSOLVED OXYGEN                    PARAMETER  2.  MEAN    5.650LIMITS     .906  LOW    4.744  HIGH    6.556
X03   TURBIDITY IN JACKSON UNITS          PARAMETER  3.  MEAN    1.674LIMITS     .702  LOW     .972  HIGH    2.376
X29   TOTAL DISSOLVED SOLIDS (MG/L)       PARAMETER 29.  MEAN  243.406LIMITS   27.149  LOW  216.256  HIGH  270.556
X30   TOTAL FILTERABLE SOLIDS (MG/L)      PARAMETER 30.  MEAN   10.600LIMITS    6.237  LOW    4.363  HIGH   14.837
X31   TOTAL VOLATILE SOLIDS (MG/L)        PARAMETER 31.  MEAN  138.261LIMITS   22.971  LOW  115.340  HIGH  161.182
X18   PH LAB                              PARAMETER 18.  MEAN    7.306LIMITS     .081  LOW    7.659  HIGH    7.421
X37   HARDNESS FROM CA AND MG             PARAMETER 37.  MEAN  199.391LIMITS   21.338  LOW  178.054  HIGH  220.729
X36   ALKALINITY AS CACO3                 PARAMETER 36.  MEAN  181.972LIMITS   14.780  LOW  166.192  HIGH  196.752
X38   CALCIUM          MG/L               PARAMETER 38.  MEAN   49.548LIMITS    6.347  LOW   43.241  HIGH   54.935
X39   MAGNESIUM        MG/L               PARAMETER 39.  MEAN   19.248LIMITS    2.020  LOW   17.270  HIGH   21.309
X41   POTASSIUM        MG/L               PARAMETER 41.  MEAN    3.062LIMITS     .479  LOW    2.543  HIGH    3.541
X99   RIVER MILLAGE
X100  TIME

PARAMETER 19.   MEAN      .024   MAX      .1760   MIN      .0040   VARIANCE      .001   SAMPLE SIZE   39.
PARAMETER 20.   MEAN      .030   MAX      .0000   MIN      .0000   VARIANCE      .000   SAMPLE SIZE    0.
PARAMETER 22.   MEAN      .076   MAX      .1340   MIN      .0200   VARIANCE      .001   SAMPLE SIZE   33.
PARAMETER 23.   MEAN    1.467    MAX    3.3400    MIN      .9200   VARIANCE      .261   SAMPLE SIZE   39.
PARAMETER 24.   MEAN      .521   MAX    1.7100    MIN      .0400   VARIANCE      .163   SAMPLE SIZE   36.
PARAMETER 25.   MEAN      .132   MAX      .2300   MIN      .0700   VARIANCE      .003   SAMPLE SIZE    6.
PARAMETER  2.   MEAN    5.650    MAX    9.3000    MIN    1.5000   VARIANCE     4.175   SAMPLE SIZE   22.
PARAMETER  3.   MEAN    1.674    MAX    6.8000    MIN      .4000   VARIANCE     3.144   SAMPLE SIZE   39.
PARAMETER 29.   MEAN  243.406    MAX  496.0000    MIN  148.0000   VARIANCE 5491.216   SAMPLE SIZE   32.
PARAMETER 30.   MEAN   10.600    MAX   47.0000    MIN    1.0000   VARIANCE  128.800   SAMPLE SIZE   30.
PARAMETER 31.   MEAN  138.261    MAX  335.0000    MIN   84.0000   VARIANCE 2489.111   SAMPLE SIZE   23.
PARAMETER 18.   MEAN    7.340    MAX    8.2000    MIN    7.3000   VARIANCE      .055   SAMPLE SIZE   35.
PARAMETER 37.   MEAN  199.391    MAX  373.6470    MIN   85.0000   VARIANCE 3735.525   SAMPLE SIZE   34.
PARAMETER 36.   MEAN  181.972    MAX  288.0000    MIN   18.0000   VARIANCE 2687.856   SAMPLE SIZE   36.
PARAMETER 38.   MEAN   49.548    MAX   87.0000    MIN   19.0000   VARIANCE  234.553   SAMPLE SIZE   34.
PARAMETER 39.   MEAN   19.248    MAX   40.0000    MIN   13.0000   VARIANCE   38.049   SAMPLE SIZE   38.
PARAMETER 41.   MEAN    3.062    MAX    6.3000    MIN      .8000   VARIANCE    1.802   SAMPLE SIZE   34.
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Table 44. Site 405 SUMMER

SITES 410

YEAR TO TO 73
MONTH 3 4 5 6 7
DAY NO RESTRAINT
HOUR NO RESTRAINT

TYPE NO RESTRAINT

BASIN NO RESTRAINT
SUBBASIN NO RESTRAINT
LOCATION NO RESTRAINT

COUNTY NO RESTRAINT
TOWNSHIP NO RESTRAINT
LONGITUDE NO RESTRAINT
LATITUDE NO RESTRAINT

PARAMETER VALUE NO RESTRAINT

DEPTH NO RESTRAINT

T TEST (.05)

X19	SOLUBLE [illegible] PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.005	LIMITS	.041	LOW	.054	HIGH	.134
X20	TOTAL SOLU[illegible] PHOSPHORUS	PARAMETER 20.	MEAN	.0481	LIMITS	.030	LOW	.066	HIGH	.080
X22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.122[illegible]	LIMITS	.021	LOW	.101	HIGH	.144
X23	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	1.647[illegible]	LIMITS	.141	LOW	1.594	HIGH	1.789
X24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.578[illegible]	LIMITS	.108	LOW	.470	HIGH	.686
X25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.137[illegible]	LIMITS	.043	LOW	.094	HIGH	.181
X02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	5.656[illegible]	LIMITS	.907	LOW	4.754	HIGH	6.557
X03	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	12.355[illegible]	LIMITS	7.366	LOW	4.989	HIGH	19.720
X29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	424.872[illegible]	LIMITS	41.691	LOW	387.381	HIGH	470.362
X30	TOTAL FILTRABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	17.896[illegible]	LIMITS	6.672	LOW	11.223	HIGH	24.567
X31	TOTAL VOLATILE SOLIDS (MG/L)	PARAMETER 31.	MEAN	159.897[illegible]	LIMITS	15.307	LOW	144.590	HIGH	175.203
X1A	PH LAB	PARAMETER 1A.	MEAN	7.636[illegible]	LIMITS	.120	LOW	7.516	HIGH	7.756
X37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	299.026[illegible]	LIMITS	32.663	LOW	266.363	HIGH	331.690
X36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	276.196[illegible]	LIMITS	23.739	LOW	252.456	HIGH	299.936
X38	CALCIUM MG/L	PARAMETER 38.	MEAN	73.070[illegible]	LIMITS	8.104	LOW	64.966	HIGH	81.174
X39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	28.705[illegible]	LIMITS	3.139	LOW	25.566	HIGH	31.843
X41	POTASSIUM MG/L	PARAMETER 41.	MEAN	4.160[illegible]	LIMITS	.408	LOW	3.752	HIGH	4.568
X99	RIVER MILEAGE									
X100	TIME									

PARAMETER 19.	MEAN	.005	MAX	.7500	MIN	.0100	VARIANCE	.010	SAMPLE SIZE	47.
PARAMETER 20.	MEAN	.048	MAX	.0400	MIN	.0480	VARIANCE	.000	SAMPLE SIZE	47.
PARAMETER 22.	MEAN	.122	MAX	.3500	MIN	.0250	VARIANCE	.005	SAMPLE SIZE	47.
PARAMETER 23.	MEAN	1.647	MAX	2.4800	MIN	.6600	VARIANCE	.231	SAMPLE SIZE	46.
PARAMETER 24.	MEAN	.578	MAX	1.5000	MIN	.0400	VARIANCE	.123	SAMPLE SIZE	43.
PARAMETER 25.	MEAN	.137	MAX	.3500	MIN	.0500	VARIANCE	.006	SAMPLE SIZE	15.
PARAMETER 2.	MEAN	5.656	MAX	9.4000	MIN	3.2000	VARIANCE	3.288	SAMPLE SIZE	18.
PARAMETER 3.	MEAN	12.355	MAX	55.0000	MIN	1.1000	VARIANCE	275.881	SAMPLE SIZE	22.
PARAMETER 29.	MEAN	424.872	MAX	658.0000	MIN	230.0000	VARIANCE	*********	SAMPLE SIZE	39.
PARAMETER 30.	MEAN	17.896	MAX	91.0000	MIN	3.0000	VARIANCE	415.178	SAMPLE SIZE	38.
PARAMETER 31.	MEAN	159.897	MAX	217.0000	MIN	88.0000	VARIANCE	1619.953	SAMPLE SIZE	29.
PARAMETER 1A.	MEAN	7.636	MAX	8.4000	MIN	7.0000	VARIANCE	.155	SAMPLE SIZE	44.
PARAMETER 37.	MEAN	299.026	MAX	514.6870	MIN	134.5640	VARIANCE	*********	SAMPLE SIZE	42.
PARAMETER 36.	MEAN	276.196	MAX	408.0000	MIN	147.0000	VARIANCE	5670.760	SAMPLE SIZE	41.
PARAMETER 38.	MEAN	73.070	MAX	127.0000	MIN	43.0000	VARIANCE	493.114	SAMPLE SIZE	43.
PARAMETER 39.	MEAN	28.705	MAX	48.0000	MIN	6.0000	VARIANCE	106.399	SAMPLE SIZE	44.
PARAMETER 41.	MEAN	4.160	MAX	7.5000	MIN	2.2000	VARIANCE	1.843	SAMPLE SIZE	45.

Table 45. Site 410 SUMMER

SITES A10

YEAR 70 TO 73

MONTH N 9 10

DAY NO RESTRAINT

FLOW NO RESTRAINT

TYPE NO RESTRAINT

BASIN NO RESTRAINT

SUBBASIN NO RESTRAINT

LOCATION NO RESTRAINT

COUNTY NO RESTRAINT

TOWNSHIP NO RESTRAINT

LONGITUDE NO RESTRAINT

LATITUDE NO RESTRAINT

PARAMETER VALUE NO RESTRAINT

DEPTH NO RESTRAINT

T TEST (.05)

X10	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.105	LIMITS	.134	LOW	-.030	HIGH	.240
X11	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.0008	LIMITS	.000	LOW	.000	HIGH	.000
X12	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.1041	LIMITS	.045	LOW	.059	HIGH	.149
X13	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	1.4304	LIMITS	.292	LOW	1.138	HIGH	1.721
X14	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.4554	LIMITS	.152	LOW	.303	HIGH	.606
X15	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.1254	LIMITS	.106	LOW	.019	HIGH	.231
X16	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	5.7714	LIMITS	1.586	LOW	4.185	HIGH	7.358
X17	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	2.3404	LIMITS	.719	LOW	.661	HIGH	4.019
X18	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	339.1184	LIMITS	43.994	LOW	295.124	HIGH	383.111
X19	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	9.1744	LIMITS	3.531	LOW	5.644	HIGH	12.707
X21	TOTAL VOLATILE SOLIDS (MG/L)	PARAMETER 31.	MEAN	141.0004	LIMITS	15.535	LOW	125.465	HIGH	156.535
X28	PH LAB	PARAMETER 18.	MEAN	7.773	LIMITS	.233	LOW	7.541	HIGH	8.006
X37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	257.2334	LIMITS	44.897	LOW	212.336	HIGH	302.130
X38	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	249.5004	LIMITS	43.541	LOW	205.959	HIGH	293.041
X39	CALCIUM MG/L	PARAMETER 38.	MEAN	62.4674	LIMITS	12.437	LOW	50.030	HIGH	74.904
X40	MAGNESIUM MG/L	PARAMETER 39.	MEAN	24.0004	LIMITS	2.720	LOW	21.280	HIGH	26.720
X41	POTASSIUM MG/L	PARAMETER 41.	MEAN	3.9944	LIMITS	.752	LOW	3.243	HIGH	4.746
X100	RIVER MILEAGE									
	TIME									

PARAMETER 19.	MEAN	.105	MAX	1.2500	MIN	.0050	VARIANCE	.078	SAMPLE SIZE	19.
PARAMETER 20.	MEAN	.000	MAX	.0008	MIN	.0008	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 22.	MEAN	.104	MAX	.4150	MIN	.0150	VARIANCE	.009	SAMPLE SIZE	19.
PARAMETER 23.	MEAN	1.430	MAX	3.0000	MIN	.6700	VARIANCE	.382	SAMPLE SIZE	21.
PARAMETER 24.	MEAN	.455	MAX	1.2300	MIN	.1000	VARIANCE	.111	SAMPLE SIZE	21.
PARAMETER 25.	MEAN	.125	MAX	.2200	MIN	.0700	VARIANCE	.004	SAMPLE SIZE	4.
PARAMETER 2.	MEAN	5.771	MAX	8.0000	MIN	4.1000	VARIANCE	2.582	SAMPLE SIZE	7.
PARAMETER 3.	MEAN	2.340	MAX	4.0000	MIN	.7000	VARIANCE	1.917	SAMPLE SIZE	5.
PARAMETER 29.	MEAN	339.118	MAX	558.0000	MIN	219.0000	VARIANCE	7320.735	SAMPLE SIZE	17.
PARAMETER 30.	MEAN	9.174	MAX	30.0000	MIN	1.0000	VARIANCE	47.154	SAMPLE SIZE	17.
PARAMETER 31.	MEAN	141.000	MAX	184.0000	MIN	92.0000	VARIANCE	776.714	SAMPLE SIZE	15.
PARAMETER 18.	MEAN	7.773	MAX	8.4000	MIN	7.2000	VARIANCE	.176	SAMPLE SIZE	15.
PARAMETER 37.	MEAN	257.233	MAX	458.4080	MIN	180.5810	VARIANCE	6571.590	SAMPLE SIZE	15.
PARAMETER 36.	MEAN	249.500	MAX	388.0000	MIN	175.0000	VARIANCE	4696.091	SAMPLE SIZE	15.
PARAMETER 38.	MEAN	62.467	MAX	115.0000	MIN	41.0000	VARIANCE	504.267	SAMPLE SIZE	12.
PARAMETER 39.	MEAN	24.000	MAX	41.0000	MIN	19.0000	VARIANCE	33.729	SAMPLE SIZE	15.
PARAMETER 41.	MEAN	3.994	MAX	7.3000	MIN	1.9000	VARIANCE	2.285	SAMPLE SIZE	18.

Table 46. Site 410 FALL

SITES 500

YEAR 70 TO 74
MONTH
DAY NO RESTRAINT
HOUR NO RESTRAINT

TYPE NO RESTRAINT

BASIN NO RESTRAINT
SUBBASIN NO RESTRAINT
LOCATION NO RESTRAINT

COUNTY NO RESTRAINT
TOWNSHIP NO RESTRAINT
LONGITUDE NO RESTRAINT
LATITUDE NO RESTRAINT

PARAMETER VALUE NO RESTRAINT

TERM NO RESTRAINT

T TEST (.05)

X19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.015	LIMITS	.010	LOW	.006	HIGH	.024
X20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.122	LIMITS	.056	LOW	.066	HIGH	.181
X23	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	.405	LIMITS	.133	LOW	.272	HIGH	.738
X24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.090	LIMITS	.130	LOW	-.040	HIGH	.220
X25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	8.750	LIMITS	2.593	LOW	6.157	HIGH	11.343
X03	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	10.567	LIMITS	7.178	LOW	3.390	HIGH	17.744
X29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	276.833	LIMITS	18.456	LOW	258.179	HIGH	295.488
X30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	12.200	LIMITS	8.484	LOW	3.716	HIGH	20.684
X31	TOTAL VOLATILE SOLIDS (MG/L)	PARAMETER 31.	MEAN	105.500	LIMITS	16.352	LOW	89.148	HIGH	121.852
X18	PH LAB	PARAMETER 18.	MEAN	8.200	LIMITS	.096	LOW	8.104	HIGH	8.296
X17	HARDNESS FROM CA AND MG	PARAMETER 17.	MEAN	218.166	LIMITS	17.184	LOW	201.160	HIGH	235.527
X3A	ALKALINITY AS CACO3	PARAMETER 34.	MEAN	230.167	LIMITS	20.838	LOW	209.329	HIGH	251.005
X38	CALCIUM MG/L	PARAMETER 38.	MEAN	48.000	LIMITS	5.900	LOW	42.100	HIGH	53.900
X39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	23.200	LIMITS	.555	LOW	22.645	HIGH	23.755
X41	POTASSIUM MG/L	PARAMETER 41.	MEAN	4.183	LIMITS	.334	LOW	3.849	HIGH	4.518
X99	RIVER MILEAGE									
X100	TIME									

PARAMETER 19.	MEAN	.015	MAX	.0300	MIN	.0050	VARIANCE	.000	SAMPLE SIZE 6.
PARAMETER 20.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE 6.
PARAMETER 22.	MEAN	.122	MAX	.2250	MIN	.0640	VARIANCE	.003	SAMPLE SIZE 6.
PARAMETER 23.	MEAN	.405	MAX	.7600	MIN	.4200	VARIANCE	.016	SAMPLE SIZE 6.
PARAMETER 24.	MEAN	.090	MAX	.3400	MIN	.0200	VARIANCE	.015	SAMPLE SIZE 6.
PARAMETER 25.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE 6.
PARAMETER 2.	MEAN	8.750	MAX	10.0000	MIN	6.5000	VARIANCE	2.657	SAMPLE SIZE 4.
PARAMETER 3.	MEAN	10.567	MAX	19.5000	MIN	2.5000	VARIANCE	46.747	SAMPLE SIZE 6.
PARAMETER 29.	MEAN	276.833	MAX	296.0000	MIN	250.0000	VARIANCE	251.767	SAMPLE SIZE 6.
PARAMETER 30.	MEAN	12.200	MAX	21.0000	MIN	5.0000	VARIANCE	46.700	SAMPLE SIZE 5.
PARAMETER 31.	MEAN	105.500	MAX	131.0000	MIN	91.0000	VARIANCE	242.700	SAMPLE SIZE 6.
PARAMETER 18.	MEAN	8.200	MAX	8.3000	MIN	8.1000	VARIANCE	.008	SAMPLE SIZE 6.
PARAMETER 17.	MEAN	218.166	MAX	234.5000	MIN	199.5420	VARIANCE	191.583	SAMPLE SIZE 5.
PARAMETER 34.	MEAN	230.167	MAX	250.0000	MIN	196.0000	VARIANCE	394.167	SAMPLE SIZE 6.
PARAMETER 38.	MEAN	48.000	MAX	54.0000	MIN	42.0000	VARIANCE	31.600	SAMPLE SIZE 6.
PARAMETER 39.	MEAN	23.200	MAX	24.0000	MIN	23.0000	VARIANCE	.200	SAMPLE SIZE 6.
PARAMETER 41.	MEAN	4.183	MAX	4.8000	MIN	3.9000	VARIANCE	.102	SAMPLE SIZE 6.

Table 47. Site 500 SUMMER

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SITES                  500

YEAR                    70 TO  73
MONTH                    8      9          10
DAY                 NO RESTRAINT
HOUR                NO RESTRAINT

TYPE                NO RESTRAINT

BASIN               NO RESTRAINT
SUBBASIN            NO RESTRAINT
LOCATION            NO RESTRAINT

COUNTY              NO RESTRAINT
TOWNSHIP            NO RESTRAINT
LONGITUDE           NO RESTRAINT
LATITUDE            NO RESTRAINT

PARAMETER VALUE     NO RESTRAINT

DEPTH               NO RESTRAINT                    T TEST  (.95)

 100
 119   SOLUBLE ORTHO PHOSPHORUS (MG/L)      PARAMETER 19.  MEAN     .1391 UNITS      .347  LOW    -.206  HIGH     .485
 120   TOTAL SOLUBLE PHOSPHORUS             PARAMETER 20.  MEAN     .0001 UNITS      .000  LOW    -.000  HIGH     .000
 122   TOTAL PHOSPHORUS                     PARAMETER 22.  MEAN     .2931 UNITS      .418  LOW    -.169  HIGH     .472
 123   KJEDAHL NITROGEN (MG/L)              PARAMETER 23.  MEAN    1.6471 UNITS     1.311  LOW    -.376  HIGH    3.958
 124   AMMONIA NITROGEN (MG/L)              PARAMETER 24.  MEAN     .2831 UNITS      .404  LOW    -.121  HIGH     .687
 125   NITRATE - NITROGEN (MG/L)            PARAMETER 25.  MEAN     .0001 UNITS      .000  LOW     .000  HIGH     .000
 132   DISSOLVED OXYGEN                     PARAMETER  2.  MEAN    11.5001 UNITS     9.000  LOW    2.000  HIGH    21.000
 138   TURBIDITY IN JACKSON UNITS           PARAMETER  3.  MEAN     7.8501 UNITS     2.965  LOW   -11.500  HIGH    11.500
 139   TOTAL DISSOLVED SOLIDS (MG/L)        PARAMETER 20.  MEAN   302.3331 UNITS   104.352  LOW   -11.115  HIGH   208.415
 140   TOTAL FILTERABLE SOLIDS (MG/L)       PARAMETER 30.  MEAN    25.3331 UNITS    29.746  LOW    -7.441  HIGH    54.127
 141   TOTAL VOLATILE SOLIDS (MG/L)         PARAMETER 31.  MEAN   176.0001 UNITS    44.163  LOW    79.837  HIGH   148.163
 148   PH LAB                               PARAMETER 18.  MEAN     8.1501 UNITS     3.174  LOW     4.976  HIGH    11.324
 157   HARDNESS FROM CA AND MG              PARAMETER 37.  MEAN   234.9491 UNITS    97.354  LOW   137.592  HIGH   332.305
 174   ALKALINITY AS CACO3                  PARAMETER 36.  MEAN     .0001 UNITS      .000  LOW     .000  HIGH     .000
 194   CALCIUM          MG/L                PARAMETER 38.  MEAN    52.3331 UNITS    25.858  LOW   25.474  HIGH    79.191
 199   MAGNESIUM        MG/L                PARAMETER 39.  MEAN    25.3331 UNITS     7.984  LOW   17.347  HIGH    33.319
 241   POTASSIUM        MG/L                PARAMETER 41.  MEAN     4.2001 UNITS      .497  LOW    3.703  HIGH     4.697
 270   RIVER MILEAGE
1100   TIME

PARAMETER 19.   MEAN      .139   MAX      .2890   MIN      .0170   VARIANCE      .019   SAMPLE SIZE   3.
PARAMETER 20.   MEAN      .000   MAX      .0000   MIN      .0000   VARIANCE      .000   SAMPLE SIZE   8.
PARAMETER 22.   MEAN      .253   MAX      .4240   MIN      .0970   VARIANCE      .028   SAMPLE SIZE   3.
PARAMETER 23.   MEAN     1.647   MAX     7.0000   MIN     1.0400   VARIANCE      .379   SAMPLE SIZE   3.
PARAMETER 24.   MEAN      .283   MAX      .4100   MIN      .1000   VARIANCE      .028   SAMPLE SIZE   3.
PARAMETER 25.   MEAN      .000   MAX      .0000   MIN      .0000   VARIANCE      .000   SAMPLE SIZE   8.
PARAMETER  2.   MEAN    11.500   MAX    11.5000   MIN    11.5000   VARIANCE      .000   SAMPLE SIZE   1.
PARAMETER  3.   MEAN     7.850   MAX     9.5000   MIN     6.2000   VARIANCE     5.445   SAMPLE SIZE   3.
PARAMETER 20.   MEAN   302.333   MAX   344.0000   MIN   240.0000   VARIANCE  1764.333   SAMPLE SIZE   3.
PARAMETER 30.   MEAN    25.333   MAX    33.0000   MIN    12.0000   VARIANCE   134.333   SAMPLE SIZE   3.
PARAMETER 31.   MEAN   176.000   MAX   144.0000   MIN   110.0000   VARIANCE   916.000   SAMPLE SIZE   3.
PARAMETER 18.   MEAN     8.150   MAX     8.4000   MIN     7.9000   VARIANCE      .123   SAMPLE SIZE   3.
PARAMETER 37.   MEAN   234.949   MAX   279.1720   MIN   204.5360   VARIANCE  1535.498   SAMPLE SIZE   3.
PARAMETER 36.   MEAN      .000   MAX      .0000   MIN      .0000   VARIANCE      .000   SAMPLE SIZE   8.
PARAMETER 38.   MEAN    52.333   MAX    64.0000   MIN    44.0000   VARIANCE   108.333   SAMPLE SIZE   3.
PARAMETER 39.   MEAN    25.333   MAX    29.0000   MIN    23.0000   VARIANCE    10.333   SAMPLE SIZE   3.
PARAMETER 41.   MEAN     4.700   MAX     4.4000   MIN     4.0000   VARIANCE      .040   SAMPLE SIZE   3.
```

Table 48. Site 500 FALL

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ES              600

              TO TO  TO
TH             3   4      5      6      7

P              NO RESTRAINT
                NO RESTRAINT

E              NO RESTRAINT

TN             NO RESTRAINT
ASIN           NO RESTRAINT
ATION          NO RESTRAINT

TY             NO RESTRAINT
SHIP           NO RESTRAINT
TUDE           NO RESTRAINT
UDE            NO RESTRAINT

METER VALUE    NO RESTRAINT

TH             NO RESTRAINT
```

T TEST (.05)

SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.064	LIMITS	.049	LOW	.015	HIGH	.112	
TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.066	LIMITS	.000	LOW	.045	HIGH	.086	
TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.140	LIMITS	.093	LOW	.047	HIGH	.233	
KJELDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	1.080	LIMITS	.216	LOW	.844	HIGH	1.316	
AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.274	LIMITS	.354	LOW	-.081	HIGH	.628	
NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000	
DISSOLVED OXYGEN	PARAMETER 2.	MEAN	8.500	LIMITS	.000	LOW	8.500	HIGH	8.500	
TURBIDITY IN JACKSON UNITS	PARAMETER 1.	MEAN	10.775	LIMITS	6.943	LOW	3.832	HIGH	17.718	
TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	351.000	LIMITS	72.328	LOW	278.672	HIGH	423.328	
TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	8.750	LIMITS	10.583	LOW	-1.833	HIGH	19.333	
TOTAL VOLATIBLE SOLIDS (MG/L)	PARAMETER 31.	MEAN	128.500	LIMITS	33.132	LOW	95.368	HIGH	161.632	
PH LAB	PARAMETER 14.	MEAN	8.150	LIMITS	.092	LOW	8.058	HIGH	8.242	
HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	243.863	LIMITS	68.161	LOW	175.702	HIGH	312.025	
ALKALINITY AS CACO3	PARAMETER 36.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000	
CALCIUM MG/L	PARAMETER 38.	MEAN	51.500	LIMITS	6.353	LOW	45.147	HIGH	57.853	
MAGNESIUM MG/L	PARAMETER 39.	MEAN	27.000	LIMITS	2.250	LOW	24.750	HIGH	29.250	
POTASSIUM MG/L	PARAMETER 41.	MEAN	5.400	LIMITS	.468	LOW	4.932	HIGH	5.868	
RIVER MILEAGE										
TIME										

TER 19.	MEAN	.064	MAX	.0720	MIN	.0210	VARIANCE	.000	SAMPLE SIZE	3.
TER 20.	MEAN	.066	MAX	.0680	MIN	.0640	VARIANCE	.000	SAMPLE SIZE	2.
TER 22.	MEAN	.140	MAX	.2250	MIN	.0900	VARIANCE	.003	SAMPLE SIZE	4.
TER 23.	MEAN	1.080	MAX	1.2800	MIN	.9800	VARIANCE	.018	SAMPLE SIZE	4.
TER 24.	MEAN	.274	MAX	.5000	MIN	.0400	VARIANCE	.056	SAMPLE SIZE	4.
TER 25.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
TER 2.	MEAN	8.500	MAX	8.5000	MIN	8.5000	VARIANCE	.000	SAMPLE SIZE	1.
TER 1.	MEAN	10.775	MAX	17.0000	MIN	6.8000	VARIANCE	19.042	SAMPLE SIZE	4.
TER 29.	MEAN	351.000	MAX	411.0000	MIN	301.0000	VARIANCE	2066.667	SAMPLE SIZE	4.
TER 30.	MEAN	8.750	MAX	17.0000	MIN	1.0000	VARIANCE	44.250	SAMPLE SIZE	4.
TER 31.	MEAN	128.500	MAX	151.0000	MIN	102.0000	VARIANCE	433.667	SAMPLE SIZE	4.
TER 14.	MEAN	8.150	MAX	8.2000	MIN	8.1000	VARIANCE	.003	SAMPLE SIZE	4.
TER 37.	MEAN	243.863	MAX	249.2000	MIN	236.4749	VARIANCE	57.556	SAMPLE SIZE	2.
TER 36.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
TER 38.	MEAN	51.500	MAX	52.0000	MIN	51.0000	VARIANCE	.500	SAMPLE SIZE	2.
TER 39.	MEAN	27.000	MAX	29.0000	MIN	25.0000	VARIANCE	2.000	SAMPLE SIZE	2.
TER 41.	MEAN	5.400	MAX	5.7000	MIN	5.1000	VARIANCE	.087	SAMPLE SIZE	4.

Table 49. Site 600 SUMMAR

SITES 600

YEAR 70 TO 73
MONTH 8 8 10
DAY NO RESTRAINT
HOUR NO RESTRAINT

TYPE NO RESTRAINT

BASIN NO RESTRAINT
SUBASIN NO RESTRAINT
LOCATION NO RESTRAINT

COUNTY NO RESTRAINT
OWNERSHIP NO RESTRAINT
LATITUDE NO RESTRAINT
LONGITUDE NO RESTRAINT

PARAMETER VALUE NO RESTRAINT

DEPTH NO RESTRAINT

T TEST (.05)

19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.337	LIMITS	.064	LOW	.273	HIGH	.401
20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.442	LIMITS	.111	LOW	.331	HIGH	.553
23	KJELDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	2.296	LIMITS	.315	LOW	1.981	HIGH	2.612
24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.321	LIMITS	.093	LOW	.228	HIGH	.414
25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
2	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	7.014	LIMITS	1.361	LOW	5.653	HIGH	8.375
3	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	8.893	LIMITS	6.715	LOW	2.168	HIGH	15.608
29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	402.556	LIMITS	38.984	LOW	363.571	HIGH	441.540
30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	22.278	LIMITS	3.195	LOW	19.083	HIGH	25.473
31	TOTAL VOLATIBLE SOLIDS (MG/L)	PARAMETER 31.	MEAN	193.357	LIMITS	19.262	LOW	174.095	HIGH	212.619
18	PH LAB	PARAMETER 18.	MEAN	7.917	LIMITS	.154	LOW	7.762	HIGH	8.071
37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	267.252	LIMITS	17.873	LOW	249.379	HIGH	285.125
35	ALKALINITY AS CACO3	PARAMETER 34.	MEAN	216.333	LIMITS	16.164	LOW	200.169	HIGH	232.497
38	CALCIUM MG/L	PARAMETER 38.	MEAN	55.600	LIMITS	3.125	LOW	52.475	HIGH	58.725
39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	31.056	LIMITS	2.475	LOW	28.581	HIGH	33.530
41	POTASSIUM MG/L	PARAMETER 41.	MEAN	5.061	LIMITS	.811	LOW	4.250	HIGH	5.872
99	RIVER MILEAGE									
109	TIME									

PARAMETER 19.	MEAN	.337	MAX	.5900	MIN	.1020	VARIANCE	.016	SAMPLE SIZE	17.
PARAMETER 20.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 22.	MEAN	.442	MAX	.7600	MIN	.0820	VARIANCE	.046	SAMPLE SIZE	17.
PARAMETER 23.	MEAN	2.296	MAX	2.9800	MIN	.9200	VARIANCE	.376	SAMPLE SIZE	17.
PARAMETER 24.	MEAN	.321	MAX	.6900	MIN	.0400	VARIANCE	.033	SAMPLE SIZE	17.
PARAMETER 25.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 2.	MEAN	7.014	MAX	9.7000	MIN	5.0030	VARIANCE	2.165	SAMPLE SIZE	7.
PARAMETER 3.	MEAN	8.893	MAX	14.0000	MIN	3.5000	VARIANCE	40.934	SAMPLE SIZE	6.
PARAMETER 29.	MEAN	402.556	MAX	530.0000	MIN	225.0000	VARIANCE	6144.496	SAMPLE SIZE	18.
PARAMETER 30.	MEAN	22.278	MAX	35.0000	MIN	11.0000	VARIANCE	41.271	SAMPLE SIZE	18.
PARAMETER 31.	MEAN	193.357	MAX	236.0000	MIN	138.0000	VARIANCE	1113.324	SAMPLE SIZE	14.
PARAMETER 18.	MEAN	7.917	MAX	8.1000	MIN	7.7000	VARIANCE	.022	SAMPLE SIZE	6.
PARAMETER 37.	MEAN	267.252	MAX	338.2780	MIN	220.2590	VARIANCE	1041.440	SAMPLE SIZE	15.
PARAMETER 34.	MEAN	216.333	MAX	223.0000	MIN	210.0000	VARIANCE	42.333	SAMPLE SIZE	3.
PARAMETER 38.	MEAN	55.600	MAX	65.0000	MIN	47.0000	VARIANCE	31.829	SAMPLE SIZE	15.
PARAMETER 39.	MEAN	31.056	MAX	47.0000	MIN	25.0000	VARIANCE	24.761	SAMPLE SIZE	18.
PARAMETER 41.	MEAN	5.061	MAX	6.9000	MIN	2.2000	VARIANCE	2.659	SAMPLE SIZE	18.

Table 50. Site 600 FALL

SITES 700

YEAR 72 TO 73
MONTH 1 2 5 6 7
DAY NO RESTRAINT
HOUR NO RESTRAINT

TYPE NO RESTRAINT

BASIN NO RESTRAINT
SUBBASIN NO RESTRAINT
LOCATION NO RESTRAINT

COUNTY NO RESTRAINT
TOWNSHIP NO RESTRAINT
LONGITUDE NO RESTRAINT
LATITUDE NO RESTRAINT

PARAMETER VALUE NO RESTRAINT
DEPTH NO RESTRAINT

T TEST (.05)

X19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.034	LIMITS	.008	LOW	.026	HIGH	.042
X20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.126	LIMITS	.034	LOW	.092	HIGH	.160
X23	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	.644	LIMITS	.157	LOW	.487	HIGH	.800
X24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.124	LIMITS	.034	LOW	.038	HIGH	.210
X25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	8.167	LIMITS	.468	LOW	7.699	HIGH	8.634
X03	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	12.483	LIMITS	3.414	LOW	9.070	HIGH	15.897
X29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	307.182	LIMITS	32.716	LOW	274.466	HIGH	339.897
X30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	5.636	LIMITS	1.953	LOW	3.683	HIGH	7.590
X31	TOTAL VOLATILE SOLIDS (MG/L)	PARAMETER 31.	MEAN	111.545	LIMITS	14.443	LOW	97.102	HIGH	125.989
X18	PH LAB	PARAMETER 18.	MEAN	8.190	LIMITS	.119	LOW	8.071	HIGH	8.309
X37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	216.660	LIMITS	39.780	LOW	176.880	HIGH	256.439
X36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	249.833	LIMITS	34.160	LOW	215.673	HIGH	283.993
X38	CALCIUM MG/L	PARAMETER 38.	MEAN	51.778	LIMITS	9.452	LOW	42.326	HIGH	61.229
X39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	22.273	LIMITS	3.479	LOW	18.794	HIGH	25.752
X41	POTASSIUM MG/L	PARAMETER 41.	MEAN	4.309	LIMITS	.592	LOW	3.717	HIGH	4.901
X09	RIVER MILEAGE									
X100	TIME									

PARAMETER 19.	MEAN .034	MAX .0520	MIN .0100	VARIANCE .000	SAMPLE SIZE	11.
PARAMETER 20.	MEAN .000	MAX .0000	MIN .0000	VARIANCE .000	SAMPLE SIZE	0.
PARAMETER 22.	MEAN .126	MAX .2500	MIN .0750	VARIANCE .003	SAMPLE SIZE	11.
PARAMETER 23.	MEAN .644	MAX .9800	MIN .2400	VARIANCE .054	SAMPLE SIZE	11.
PARAMETER 24.	MEAN .124	MAX .4100	MIN .0400	VARIANCE .020	SAMPLE SIZE	11.
PARAMETER 25.	MEAN .000	MAX .0000	MIN .0000	VARIANCE .000	SAMPLE SIZE	0.
PARAMETER 2.	MEAN 8.167	MAX 8.6000	MIN 7.3000	VARIANCE .199	SAMPLE SIZE	6.
PARAMETER 3.	MEAN 12.483	MAX 20.1000	MIN 6.5000	VARIANCE 28.867	SAMPLE SIZE	12.
PARAMETER 29.	MEAN 307.182	MAX 367.0000	MIN 214.0000	VARIANCE 2371.764	SAMPLE SIZE	11.
PARAMETER 30.	MEAN 5.636	MAX 11.0000	MIN 2.0000	VARIANCE 8.455	SAMPLE SIZE	11.
PARAMETER 31.	MEAN 111.545	MAX 134.0000	MIN 70.0000	VARIANCE 462.273	SAMPLE SIZE	11.
PARAMETER 18.	MEAN 8.190	MAX 8.5000	MIN 8.0000	VARIANCE .028	SAMPLE SIZE	10.
PARAMETER 37.	MEAN 216.660	MAX 271.8180	MIN 149.1359	VARIANCE 2678.220	SAMPLE SIZE	9.
PARAMETER 36.	MEAN 249.833	MAX 296.0000	MIN 162.0000	VARIANCE 2890.515	SAMPLE SIZE	12.
PARAMETER 38.	MEAN 51.778	MAX 66.0000	MIN 35.0000	VARIANCE 151.194	SAMPLE SIZE	9.
PARAMETER 39.	MEAN 22.273	MAX 27.0000	MIN 14.0000	VARIANCE 26.818	SAMPLE SIZE	11.
PARAMETER 41.	MEAN 4.309	MAX 6.0000	MIN 3.4000	VARIANCE .777	SAMPLE SIZE	11.

Table 51. Site 700 SUMMER

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SITES                 700A

YEAR                  70 TO  73
MONTH                  4      9        10
DAY                NO RESTRAINT
HOUR               NO RESTRAINT

TYPE               NO RESTRAINT

BASIN              NO RESTRAINT
SUBBASIN           NO RESTRAINT
LOCATION           NO RESTRAINT

COUNTY             NO RESTRAINT
TOWNSHIP           NO RESTRAINT
LONGITUDE          NO RESTRAINT
LATITUDE           NO RESTRAINT

PARAMETER VALUE    NO RESTRAINT

DEPTH              NO RESTRAINT                    T TEST  (.05)

 X19   SOLUBLE ORTHO PHOSPHORUS (MG/L)    PARAMETER 19.  MEAN     .129LIMITS     .127  LOW     .882  HIGH     .347
 X20   TOTAL SOLUBLE PHOSPHORUS           PARAMETER 20.  MEAN     .032LIMITS     .000  LOW     .032  HIGH     .032
 X22   TOTAL PHOSPHORUS                   PARAMETER 22.  MEAN     .160LIMITS     .054  LOW     .114  HIGH     .222
 X23   KJEDAHL NITROGEN (MG/L)            PARAMETER 23.  MEAN    1.544LIMITS     .233  LOW    1.311  HIGH    1.777
 X24   AMMONIA NITROGEN (MG/L)            PARAMETER 24.  MEAN     .138LIMITS     .078  LOW     .059  HIGH     .216
 X25   NITRATE - NITROGEN (MG/L)          PARAMETER 25.  MEAN     .000LIMITS     .000  LOW     .000  HIGH     .000
 X02   DISSOLVED OXYGEN                   PARAMETER  2.  MEAN   10.100LIMITS     .000  LOW   10.100  HIGH   10.100
 X03   TURBIDITY IN JACKSON UNITS         PARAMETER  3.  MEAN   20.100LIMITS  189.319  LOW-169.219  HIGH  209.419
 X29   TOTAL DISSOLVED SOLIDS (MG/L)      PARAMETER 29.  MEAN  213.357LIMITS   17.455  LOW  195.902  HIGH  230.812
 X30   TOTAL FILTERABLE SOLIDS (MG/L)     PARAMETER 30.  MEAN   34.214LIMITS   21.614  LOW   12.600  HIGH   55.829
 X31   TOTAL VOLATIPLE SOLIDS (MG/L)      PARAMETER 31.  MEAN  100.714LIMITS    7.852  LOW   92.863  HIGH  108.566
 X1A   PH LAB                             PARAMETER 1A.  MEAN    8.000LIMITS    2.541  LOW    5.459  HIGH   10.541
 X37   HARDNESS FROM CA AND MG            PARAMETER 37.  MEAN  154.903LIMITS   40.132  LOW  114.772  HIGH  194.035
 X36   ALKALINITY AS CACO3                PARAMETER 36.  MEAN     .000LIMITS     .000  LOW     .000  HIGH     .000
 X38   CALCIUM          MG/L              PARAMETER 38.  MEAN   38.500LIMITS   10.752  LOW   27.748  HIGH   49.252
 X39   MAGNESIUM        MG/L              PARAMETER 39.  MEAN   13.714LIMITS    2.371  LOW   11.343  HIGH   16.085
 X41   POTASSIUM        MG/L              PARAMETER 41.  MEAN    3.367LIMITS    1.161  LOW    2.206  HIGH    4.527
 X99   RIVER MILEAGE
X100   TIME

PARAMETER 19.  MEAN      .129  MAX      .8900  MIN      .0360  VARIANCE      .048  SAMPLE SIZE  14.
PARAMETER 20.  MEAN      .053  MAX      .0320  MIN      .0320  VARIANCE      .000  SAMPLE SIZE   1.
PARAMETER 22.  MEAN      .160  MAX      .3550  MIN      .0140  VARIANCE      .010  SAMPLE SIZE  15.
PARAMETER 23.  MEAN     1.544  MAX     2.3000  MIN     1.0500  VARIANCE      .148  SAMPLE SIZE  15.
PARAMETER 24.  MEAN      .138  MAX      .5100  MIN      .0600  VARIANCE      .018  SAMPLE SIZE  14.
PARAMETER 25.  MEAN      .000  MAX      .0000  MIN      .0000  VARIANCE      .000  SAMPLE SIZE   0.
PARAMETER  2.  MEAN    10.100  MAX    10.1000  MIN    10.1000  VARIANCE      .000  SAMPLE SIZE   1.
PARAMETER  3.  MEAN    20.100  MAX    35.0000  MIN     5.2000  VARIANCE   444.020  SAMPLE SIZE   2.
PARAMETER 29.  MEAN   213.357  MAX   265.0000  MIN   162.0000  VARIANCE   914.247  SAMPLE SIZE  14.
PARAMETER 30.  MEAN    34.214  MAX   146.0000  MIN     9.0000  VARIANCE  1401.874  SAMPLE SIZE  14.
PARAMETER 31.  MEAN   100.714  MAX   121.0000  MIN    73.0000  VARIANCE   184.989  SAMPLE SIZE  14.
PARAMETER 1A.  MEAN     8.000  MAX     8.2000  MIN     7.8000  VARIANCE      .080  SAMPLE SIZE   2.
PARAMETER 37.  MEAN   154.903  MAX   184.8340  MIN   124.3020  VARIANCE   636.263  SAMPLE SIZE  14.
PARAMETER 36.  MEAN      .000  MAX      .0000  MIN      .0000  VARIANCE      .000  SAMPLE SIZE   0.
PARAMETER 38.  MEAN    38.500  MAX    46.0000  MIN    30.0000  VARIANCE    45.667  SAMPLE SIZE   4.
PARAMETER 39.  MEAN    13.714  MAX    17.0000  MIN    11.0000  VARIANCE     6.571  SAMPLE SIZE   7.
PARAMETER 41.  MEAN     3.367  MAX     5.3000  MIN     2.1000  VARIANCE     1.223  SAMPLE SIZE   6.
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Table 52. Site 700A FALL

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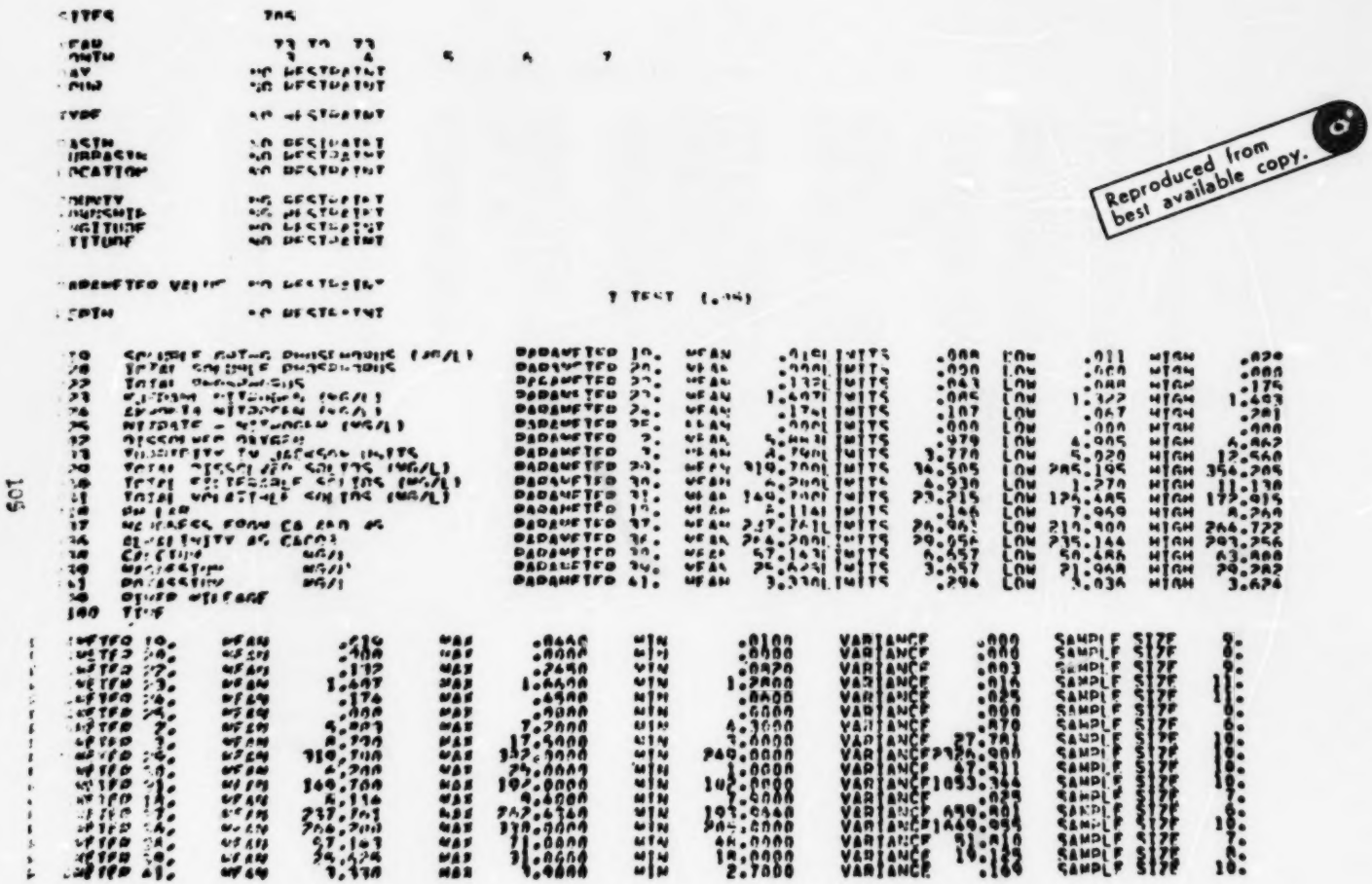

Table 53. Site 705 SUMMER

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SITES                710

YEAR                  70 TO  73
MONTH                  8      9          10
DAY                NO RESTRAINT
HOUR               NO RESTRAINT

TYPE               NO RESTRAINT

BASIN              NO RESTRAINT
SUBBASIN           NO RESTRAINT
LOCATION           NO RESTRAINT

COUNTY             NO RESTRAINT
TOWNSHIP           NO RESTRAINT
LONGITUDE          NO RESTRAINT
LATITUDE           NO RESTRAINT

PARAMETER VALUE    NO RESTRAINT
DEPTH              NO RESTRAINT
```

T TEST (.05)

X19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.015	LIMITS	.008	LOW	.007	HIGH	.023
X20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.116	LIMITS	.032	LOW	.084	HIGH	.147
X23	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	1.311	LIMITS	.184	LOW	1.127	HIGH	1.495
X24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.240	LIMITS	.167	LOW	.073	HIGH	.408
X25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X03	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	278.846	LIMITS	24.294	LOW	254.552	HIGH	303.140
X30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	7.692	LIMITS	2.880	LOW	4.812	HIGH	10.572
X31	TOTAL VOLATIBLE SOLIDS (MG/L)	PARAMETER 31.	MEAN	130.538	LIMITS	13.229	LOW	117.309	HIGH	143.767
X18	PH LAB	PARAMETER 18.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	228.832	LIMITS	25.711	LOW	203.120	HIGH	254.543
X36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X38	CALCIUM MG/L	PARAMETER 38.	MEAN	55.143	LIMITS	6.991	LOW	48.151	HIGH	62.134
X39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	21.615	LIMITS	1.246	LOW	20.369	HIGH	22.862
X41	POTASSIUM MG/L	PARAMETER 41.	MEAN	3.369	LIMITS	.233	LOW	3.136	HIGH	3.602
X99	RIVER MILEAGE									
X100	TIME									

PARAMETER 19.	MEAN	.015	MAX	.0460	MIN	.0020	VARIANCE	.000	SAMPLE SIZE	14.
PARAMETER 20.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 22.	MEAN	.116	MAX	.1950	MIN	.0130	VARIANCE	.003	SAMPLE SIZE	13.
PARAMETER 23.	MEAN	1.311	MAX	1.9200	MIN	.9200	VARIANCE	.093	SAMPLE SIZE	13.
PARAMETER 24.	MEAN	.240	MAX	.9700	MIN	.0400	VARIANCE	.077	SAMPLE SIZE	13.
PARAMETER 25.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 2.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 3.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 29.	MEAN	278.846	MAX	390.0000	MIN	226.0000	VARIANCE	1617.474	SAMPLE SIZE	13.
PARAMETER 30.	MEAN	7.692	MAX	19.0000	MIN	3.0000	VARIANCE	22.731	SAMPLE SIZE	13.
PARAMETER 31.	MEAN	130.538	MAX	179.0000	MIN	110.0000	VARIANCE	479.603	SAMPLE SIZE	13.
PARAMETER 18.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 37.	MEAN	228.832	MAX	285.9220	MIN	203.7950	VARIANCE	772.826	SAMPLE SIZE	7.
PARAMETER 36.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 38.	MEAN	55.143	MAX	70.0000	MIN	47.0000	VARIANCE	57.143	SAMPLE SIZE	7.
PARAMETER 39.	MEAN	21.615	MAX	27.0000	MIN	18.0000	VARIANCE	4.256	SAMPLE SIZE	13.
PARAMETER 41.	MEAN	3.369	MAX	4.4000	MIN	2.9000	VARIANCE	.149	SAMPLE SIZE	13.

Table 54. Site 710 FALL

Table 55. Site 715 SUMMER

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SITES              801

YEAR               72 TO  73
MONTH               5      6      7
DAY                NO RESTRAINT
HOUR               NO RESTRAINT

TYPE               NO RESTRAINT

BASIN              NO RESTRAINT
SUBBASIN           NO RESTRAINT
LOCATION           NO RESTRAINT

COUNTY             NO RESTRAINT
TOWNSHIP           NO RESTRAINT
LONGITUDE          NO RESTRAINT
LATITUDE           NO RESTRAINT

PARAMETER VALUE    NO RESTRAINT                    T TEST  (.05)

DEPTH              NO RESTRAINT

X19   SOLUBLE ORTHO PHOSPHORUS (MG/L)     PARAMETER 19.  MEAN     .032LIMITS     .009 LOW     .023 HIGH     .041
X20   TOTAL SOLUBLE PHOSPHORUS            PARAMETER 20.  MEAN     .000LIMITS     .000 LOW     .000 HIGH     .000
X22   TOTAL PHOSPHORUS                    PARAMETER 22.  MEAN     .103LIMITS     .022 LOW     .081 HIGH     .124
X23   KJELDAHL NITROGEN (MG/L)            PARAMETER 23.  MEAN    1.662LIMITS     .224 LOW    1.434 HIGH    1.887
X24   AMMONIA NITROGEN (MG/L)             PARAMETER 24.  MEAN     .554LIMITS     .181 LOW     .373 HIGH     .735
X25   NITRATE - NITROGEN (MG/L)           PARAMETER 25.  MEAN     .142LIMITS     .071 LOW     .071 HIGH     .213
X02   DISSOLVED OXYGEN                    PARAMETER  2.  MEAN    8.332LIMITS    1.321 LOW    7.011 HIGH    9.653
X03   TURBIDITY IN JACKSON UNITS          PARAMETER  3.  MEAN    5.257LIMITS    2.619 LOW    2.639 HIGH    7.876
X28   TOTAL DISSOLVED SOLIDS (MG/L)       PARAMETER 29.  MEAN  311.000LIMITS   27.828 LOW  283.172 HIGH  338.828
X30   TOTAL FILTERABLE SOLIDS (MG/L)      PARAMETER 30.  MEAN    7.633LIMITS    4.674 LOW    2.959 HIGH   12.307
X31   TOTAL VOLATILE SOLIDS (MG/L)        PARAMETER 31.  MEAN  139.947LIMITS   14.059 LOW  125.889 HIGH  154.006
X18   PH LAB                              PARAMETER 18.  MEAN    7.690LIMITS     .079 LOW    7.611 HIGH    7.769
X37   HARDNESS FROM CA AND MG             PARAMETER 37.  MEAN  211.395LIMITS   24.894 LOW  186.500 HIGH  236.289
X36   ALKALINITY AS CACO3                 PARAMETER 36.  MEAN  193.200LIMITS   22.311 LOW  170.889 HIGH  215.511
X33   CALCIUM          MG/L               PARAMETER 38.  MEAN   52.852LIMITS    6.266 LOW   46.586 HIGH   59.117
X34   MAGNESIUM        MG/L               PARAMETER 39.  MEAN   19.367LIMITS    2.366 LOW   17.000 HIGH   21.733
X41   POTASSIUM        MG/L               PARAMETER 41.  MEAN    1.353LIMITS     .406 LOW     .947 HIGH    1.760
X53   RIVER MILEAGE
X100  TIME

PARAMETER 19.   MEAN      .032   MAX     .1140   MIN     .0050   VARIANCE     .001   SAMPLE SIZE   30.
PARAMETER 20.   MEAN      .000   MAX     .0000   MIN     .0000   VARIANCE     .000   SAMPLE SIZE    8.
PARAMETER 22.   MEAN      .103   MAX     .3000   MIN     .0330   VARIANCE     .004   SAMPLE SIZE   30.
PARAMETER 23.   MEAN    1.662    MAX    4.2400   MIN     .5200   VARIANCE     .381   SAMPLE SIZE   31.
PARAMETER 24.   MEAN     .554    MAX    1.7500   MIN     .0500   VARIANCE     .245   SAMPLE SIZE   31.
PARAMETER 25.   MEAN     .142    MAX     .4700   MIN     .0310   VARIANCE     .018   SAMPLE SIZE   16.
PARAMETER  2.   MEAN    8.332    MAX   16.0000   MIN    4.7000   VARIANCE    7.508   SAMPLE SIZE   19.
PARAMETER  3.   MEAN    5.257    MAX   25.0000   MIN     .3000   VARIANCE   45.594   SAMPLE SIZE   28.
PARAMETER 29.   MEAN  311.000    MAX  435.0000   MIN  189.0000   VARIANCE 5555.241   SAMPLE SIZE   30.
PARAMETER 30.   MEAN    7.633    MAX   68.0000   MIN    1.0000   VARIANCE  156.723   SAMPLE SIZE   30.
PARAMETER 31.   MEAN  139.947    MAX  193.0000   MIN  103.0000   VARIANCE  850.719   SAMPLE SIZE   19.
PARAMETER 18.   MEAN    7.690    MAX    8.2000   MIN    7.2000   VARIANCE     .044   SAMPLE SIZE   30.
PARAMETER 37.   MEAN  211.395    MAX  368.9270   MIN  112.6950   VARIANCE 3958.329   SAMPLE SIZE   27.
PARAMETER 36.   MEAN  193.200    MAX  319.0000   MIN   87.0000   VARIANCE 3570.993   SAMPLE SIZE   30.
PARAMETER 38.   MEAN   52.852    MAX   95.0000   MIN   27.0000   VARIANCE  250.746   SAMPLE SIZE   27.
PARAMETER 39.   MEAN   19.367    MAX   37.0000   MIN   11.0000   VARIANCE   40.171   SAMPLE SIZE   30.
PARAMETER 41.   MEAN    1.353    MAX    3.8000   MIN     .2000   VARIANCE    1.184   SAMPLE SIZE   30.
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Table 56. Site 801 SUMMER

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SITES                801

YEAR                  70 TO  73
MONTH                  8      8        10
DAY                NO RESTRAINT
HOUR               NO RESTRAINT

TYPE               NO RESTRAINT

BASIN              NO RESTRAINT
SUBBASIN           NO RESTRAINT
LOCATION           NO RESTRAINT

COUNTY             NO RESTRAINT
TOWNSHIP           NO RESTRAINT
LONGITUDE          NO RESTRAINT
LATITUDE           NO RESTRAINT

PARAMETER VALUE    NO RESTRAINT

DEPTH              NO RESTRAINT
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T TEST (.05)

X19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.059	LIMITS	.044	LOW	-.005	HIGH .123
X20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH .000
X22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.110	LIMITS	.103	LOW	.007	HIGH .213
X23	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	2.072	LIMITS	.455	LOW	1.617	HIGH 2.527
X24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.741	LIMITS	.400	LOW	.341	HIGH 1.141
X25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.125	LIMITS	.040	LOW	.085	HIGH .165
X02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	5.067	LIMITS	3.569	LOW	1.498	HIGH 8.635
X03	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	1.814	LIMITS	1.101	LOW	.713	HIGH 2.914
X29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	346.000	LIMITS	43.322	LOW	302.678	HIGH 389.322
X30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	17.000	LIMITS	17.291	LOW	-.291	HIGH 34.291
X31	TOTAL VOLATILE SOLIDS (MG/L)	PARAMETER 31.	MEAN	169.286	LIMITS	24.585	LOW	144.701	HIGH 193.870
X1A	PH LAB	PARAMETER 1A.	MEAN	7.650	LIMITS	.245	LOW	7.405	HIGH 7.895
X37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	214.449	LIMITS	39.761	LOW	174.688	HIGH 254.211
X36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	214.400	LIMITS	49.795	LOW	164.605	HIGH 264.195
X38	CALCIUM MG/L	PARAMETER 38.	MEAN	53.167	LIMITS	9.256	LOW	43.911	HIGH 62.423
X39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	20.625	LIMITS	3.489	LOW	17.136	HIGH 24.114
X41	POTASSIUM MG/L	PARAMETER 41.	MEAN	1.762	LIMITS	1.258	LOW	.505	HIGH 3.020
X99	RIVER MILEAGE								
X100	TIME								

PARAMETER 19.	MEAN	.059	MAX	.3000	MIN	.0020	VARIANCE	.008	SAMPLE SIZE 10.
PARAMETER 20.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE 8.
PARAMETER 22.	MEAN	.110	MAX	.4500	MIN	.0100	VARIANCE	.018	SAMPLE SIZE 9.
PARAMETER 23.	MEAN	2.072	MAX	3.2600	MIN	1.1600	VARIANCE	.350	SAMPLE SIZE 9.
PARAMETER 24.	MEAN	.741	MAX	1.5400	MIN	.0700	VARIANCE	.312	SAMPLE SIZE 10.
PARAMETER 25.	MEAN	.125	MAX	.1600	MIN	.0900	VARIANCE	.001	SAMPLE SIZE 5.
PARAMETER 2.	MEAN	5.067	MAX	6.7000	MIN	4.0000	VARIANCE	2.063	SAMPLE SIZE 3.
PARAMETER 3.	MEAN	1.814	MAX	3.4000	MIN	.6000	VARIANCE	1.418	SAMPLE SIZE 7.
PARAMETER 29.	MEAN	346.000	MAX	412.0000	MIN	266.0000	VARIANCE	3176.500	SAMPLE SIZE 9.
PARAMETER 30.	MEAN	17.000	MAX	70.0000	MIN	1.0000	VARIANCE	506.000	SAMPLE SIZE 9.
PARAMETER 31.	MEAN	169.286	MAX	204.0000	MIN	138.0000	VARIANCE	706.571	SAMPLE SIZE 7.
PARAMETER 1A.	MEAN	7.650	MAX	8.0000	MIN	7.0000	VARIANCE	.086	SAMPLE SIZE 8.
PARAMETER 37.	MEAN	214.449	MAX	257.8510	MIN	164.1170	VARIANCE	1435.064	SAMPLE SIZE 6.
PARAMETER 36.	MEAN	214.400	MAX	259.0000	MIN	159.0000	VARIANCE	1608.800	SAMPLE SIZE 5.
PARAMETER 38.	MEAN	53.167	MAX	67.0000	MIN	41.0000	VARIANCE	77.767	SAMPLE SIZE 6.
PARAMETER 39.	MEAN	20.625	MAX	25.0000	MIN	14.0000	VARIANCE	17.411	SAMPLE SIZE 8.
PARAMETER 41.	MEAN	1.762	MAX	4.7000	MIN	.1000	VARIANCE	2.263	SAMPLE SIZE 8.

Table 57. Site 801 FALL

SITES 805

YEAR 70 TO 73
MONTH 6 7 8
DAY NO RESTRAINT
HOUR NO RESTRAINT

TYPE NO RESTRAINT

BASIN NO RESTRAINT
SUBBASIN NO RESTRAINT
LOCATION NO RESTRAINT

COUNTY NO RESTRAINT
TOWNSHIP NO RESTRAINT
LONGITUDE NO RESTRAINT
LATITUDE NO RESTRAINT

PARAMETER VALUE NO RESTRAINT

DEPTH NO RESTRAINT

T TEST (.05)

X19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.13MI	LIMITS	.124	LOW	.01=	HIGH	.249
X20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.000L	LIMITS	.000	LOW	.000	HIGH	.000
X22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.153L	LIMITS	.097	LOW	.065	HIGH	.211
X23	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	2.148L	LIMITS	.177	LOW	2.011	HIGH	2.285
X24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.545L	LIMITS	.167	LOW	.428	HIGH	.762
X25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.110L	LIMITS	.019	LOW	.091	HIGH	.129
X02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	6.933L	LIMITS	1.196	LOW	5.737	HIGH	8.129
X03	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	3.321L	LIMITS	1.143	LOW	2.178	HIGH	4.464
X29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	293.062L	LIMITS	18.236	LOW	274.826	HIGH	311.297
X30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	9.929L	LIMITS	3.213	LOW	6.716	HIGH	13.142
X31	TOTAL VOLATIPLE SOLIDS (MG/L)	PARAMETER 31.	MEAN	145.476L	LIMITS	12.638	LOW	132.838	HIGH	158.114
X18	PH LAB	PARAMETER 18.	MEAN	7.800L	LIMITS	.155	LOW	7.645	HIGH	7.955
X37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	205.243L	LIMITS	21.274	LOW	183.970	HIGH	226.517
X36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	185.897L	LIMITS	17.786	LOW	168.111	HIGH	203.683
X34	CALCIUM MG/L	PARAMETER 34.	MEAN	49.429L	LIMITS	5.636	LOW	43.793	HIGH	55.066
X39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	19.867L	LIMITS	1.770	LOW	18.097	HIGH	21.636
X41	POTASSIUM MG/L	PARAMETER 41.	MEAN	2.252L	LIMITS	.586	LOW	1.665	HIGH	2.841
X44	RIVER MILEAGE									
X100	TIME									

PARAMETER 19.	MEAN	.138	MAX	1.4550	MIN	.0090	VARIANCE	.119	SAMPLE SIZE	32.
PARAMETER 20.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	8.
PARAMETER 22.	MEAN	.153	MAX	.4970	MIN	.0250	VARIANCE	.024	SAMPLE SIZE	30.
PARAMETER 23.	MEAN	2.148	MAX	3.3600	MIN	1.3800	VARIANCE	.262	SAMPLE SIZE	32.
PARAMETER 24.	MEAN	.545	MAX	1.5000	MIN	.0700	VARIANCE	.178	SAMPLE SIZE	27.
PARAMETER 25.	MEAN	.110	MAX	.2100	MIN	.0400	VARIANCE	.001	SAMPLE SIZE	18.
PARAMETER 2.	MEAN	6.933	MAX	13.7000	MIN	3.4000	VARIANCE	8.020	SAMPLE SIZE	24.
PARAMETER 3.	MEAN	3.321	MAX	15.0000	MIN	.3000	VARIANCE	9.033	SAMPLE SIZE	29.
PARAMETER 29.	MEAN	293.062	MAX	373.0000	MIN	181.0000	VARIANCE	2567.415	SAMPLE SIZE	32.
PARAMETER 30.	MEAN	9.929	MAX	40.0000	MIN	2.0000	VARIANCE	71.772	SAMPLE SIZE	28.
PARAMETER 31.	MEAN	145.476	MAX	184.0000	MIN	99.0000	VARIANCE	770.862	SAMPLE SIZE	21.
PARAMETER 18.	MEAN	7.800	MAX	8.7000	MIN	6.6000	VARIANCE	.172	SAMPLE SIZE	30.
PARAMETER 37.	MEAN	205.243	MAX	315.1450	MIN	106.9600	VARIANCE	2890.673	SAMPLE SIZE	27.
PARAMETER 36.	MEAN	185.897	MAX	281.0000	MIN	107.0000	VARIANCE	2187.239	SAMPLE SIZE	29.
PARAMETER 34.	MEAN	49.429	MAX	85.0000	MIN	28.0000	VARIANCE	211.217	SAMPLE SIZE	28.
PARAMETER 39.	MEAN	19.867	MAX	27.0000	MIN	9.0000	VARIANCE	22.464	SAMPLE SIZE	30.
PARAMETER 41.	MEAN	2.252	MAX	6.5000	MIN	.5000	VARIANCE	2.400	SAMPLE SIZE	29.

Table 58. Site 805 SUMMER

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SITES                810

YEAR                 70 TO 73
MONTH                 3    4      5      6      7
DAY                NO RESTRAINT
HOUR               NO RESTRAINT

TYPE               NO RESTRAINT

BASIN              NO RESTRAINT
SUBBASIN           NO RESTRAINT
LOCATION           NO RESTRAINT

COUNTY             NO RESTRAINT
TOWNSHIP           NO RESTRAINT
LONGITUDE          NO RESTRAINT
LATITUDE           NO RESTRAINT

PARAMETER VALUE    NO RESTRAINT

DEPTH              NO RESTRAINT                    T TEST  (.05)

X19   SOLUBLE ORTHO PHOSPHORUS (MG/L)
X20   TOTAL SOLUBLE PHOSPHORUS
X22   TOTAL PHOSPHORUS
X23   KJEDAHL NITROGEN (MG/L)
X24   AMMONIA NITROGEN (MG/L)
X25   NITRATE - NITROGEN (MG/L)
X02   DISSOLVED OXYGEN
X03   TURBIDITY IN JACKSON UNITS
X29   TOTAL DISSOLVED SOLIDS (MG/L)
X30   TOTAL FILTERABLE SOLIDS (MG/L)
X31   TOTAL VOLATIBLE SOLIDS (MG/L)
X18   PH LAB
X37   HARDNESS FROM CA AND MG
X36   ALKALINITY AS CACO3
X38   CALCIUM              MG/L
X39   MAGNESIUM            MG/L
X41   POTASSIUM            MG/L
X99   RIVER MILEAGE
X100  TIME

PARAMETER 19.  MEAN     .12  LIMITS     .046  LOW     .081  HIGH     .174
PARAMETER 20.  MEAN     .000 LIMITS     .000  LOW     .000  HIGH     .000
PARAMETER 22.  MEAN     .10  LIMITS     .038  LOW     .145  HIGH     .223
PARAMETER 23.  MEAN    1.94  LIMITS     .294  LOW    1.646  HIGH    2.235
PARAMETER 24.  MEAN     .552 LIMITS     .166  LOW     .384  HIGH     .718
PARAMETER 25.  MEAN     .09  LIMITS     .026  LOW     .073  HIGH     .124
PARAMETER  2.  MEAN    9.110 LIMITS    1.651  LOW    7.459  HIGH   10.761
PARAMETER  3.  MEAN   10.300 LIMITS    4.014  LOW    6.286  HIGH   14.314
PARAMETER 29.  MEAN  325.11  LIMITS   15.205  LOW  309.913  HIGH  340.323
PARAMETER 30.  MEAN   13.091 LIMITS    4.987  LOW    8.104  HIGH   18.078
PARAMETER 31.  MEAN  145.000 LIMITS   11.736  LOW  133.264  HIGH  156.736
PARAMETER 18.  MEAN    7.552 LIMITS     .070  LOW    7.482  HIGH    7.621
PARAMETER 37.  MEAN  216.473 LIMITS   12.430  LOW  204.042  HIGH  228.903
PARAMETER 36.  MEAN  216.030 LIMITS   12.839  LOW  203.192  HIGH  228.869
PARAMETER 38.  MEAN   54.344 LIMITS    3.772  LOW   50.572  HIGH   58.115
PARAMETER 39.  MEAN   19.706 LIMITS    1.082  LOW   18.624  HIGH   20.788
PARAMETER 41.  MEAN    2.038 LIMITS     .429  LOW    1.610  HIGH    2.467

PARAMETER 19.  MEAN     .129   MAX     .8200  MIN     .0240  VARIANCE     .018  SAMPLE SIZE  35.
PARAMETER 20.  MEAN     .000   MAX     .0000  MIN     .0000  VARIANCE     .000  SAMPLE SIZE   0.
PARAMETER 22.  MEAN     .184   MAX     .6400  MIN     .0750  VARIANCE     .013  SAMPLE SIZE  35.
PARAMETER 23.  MEAN    1.940   MAX    4.8300  MIN     .6400  VARIANCE     .690  SAMPLE SIZE  33.
PARAMETER 24.  MEAN     .552   MAX    1.6800  MIN     .0650  VARIANCE     .207  SAMPLE SIZE  31.
PARAMETER 25.  MEAN     .098   MAX     .1630  MIN     .0120  VARIANCE     .002  SAMPLE SIZE  14.
PARAMETER  2.  MEAN    9.110   MAX   16.6000  MIN    3.8000  VARIANCE   12.442  SAMPLE SIZE  20.
PARAMETER  3.  MEAN   10.300   MAX   35.0000  MIN     .5000  VARIANCE  120.529  SAMPLE SIZE  31.
PARAMETER 29.  MEAN  325.118   MAX  399.0000  MIN  211.0000  VARIANCE 1096.834  SAMPLE SIZE  34.
PARAMETER 30.  MEAN   13.091   MAX   58.0000  MIN    2.0000  VARIANCE  198.023  SAMPLE SIZE  33.
PARAMETER 31.  MEAN  145.000   MAX  215.0000  MIN  101.0000  VARIANCE  664.700  SAMPLE SIZE  21.
PARAMETER 18.  MEAN    7.552   MAX    7.9000  MIN    7.2000  VARIANCE     .039  SAMPLE SIZE  33.
PARAMETER 37.  MEAN  216.473   MAX  275.3300  MIN  123.2870  VARIANCE 1193.141  SAMPLE SIZE  32.
PARAMETER 36.  MEAN  216.030   MAX  259.0000  MIN  104.0000  VARIANCE 1312.593  SAMPLE SIZE  33.
PARAMETER 38.  MEAN   54.344   MAX   74.0000  MIN   23.0000  VARIANCE  109.846  SAMPLE SIZE  32.
PARAMETER 39.  MEAN   19.706   MAX   24.0000  MIN   11.0000  VARIANCE    9.608  SAMPLE SIZE  34.
PARAMETER 41.  MEAN    2.038   MAX    4.4000  MIN     .2000  VARIANCE    1.507  SAMPLE SIZE  34.
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Table 59. Site 810 SUMMER

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SITES                 810

YEAR                   70 TO  73
MONTH                   A      S          10
DAY                NO RESTRAINT
HOUR               NO RESTRAINT

TYPE               NO RESTRAINT

BASIN              NO RESTRAINT
SUBBASIN           NO RESTRAINT
LOCATION           NO RESTRAINT

COUNTY             NO RESTRAINT
TOWNSHIP           NO RESTRAINT
LONGITUDE          NO RESTRAINT
LATITUDE           NO RESTRAINT

PARAMETER VALUE    NO RESTRAINT                    T TEST  (.05)
DEPTH              NO RESTRAINT

X19   SOLUBLE ORTHO PHOSPHORUS (MG/L)   PARAMETER 19.  MEAN     .069 LIMITS     .029  LOW     .040  HIGH     .098
X20   TOTAL SOLUBLE PHOSPHORUS          PARAMETER 20.  MEAN     .000 LIMITS     .000  LOW     .000  HIGH     .000
X22   TOTAL PHOSPHORUS                  PARAMETER 22.  MEAN     .175 LIMITS     .078  LOW     .097  HIGH     .253
X23   KJEDAHL NITROGEN (MG/L)           PARAMETER 23.  MEAN    2.111 LIMITS     .297  LOW    1.813  HIGH    2.408
X24   AMMONIA NITROGEN (MG/L)           PARAMETER 24.  MEAN     .662 LIMITS     .415  LOW     .247  HIGH    1.077
X25   NITRATE - NITROGEN (MG/L)         PARAMETER 25.  MEAN     .139 LIMITS     .085  LOW     .054  HIGH     .224
X02   DISSOLVED OXYGEN                  PARAMETER  2.  MEAN    6.071 LIMITS    1.560  LOW    4.511  HIGH    7.632
X03   TURBIDITY IN JACKSON UNITS        PARAMETER  3.  MEAN    2.987 LIMITS    2.160  LOW     .82A  HIGH    5.147
X29   TOTAL DISSOLVED SOLIDS (MG/L)     PARAMETER 29.  MEAN  286.133 LIMITS   33.425  LOW  252.708  HIGH  319.559
X30   TOTAL FILTERABLE SOLIDS (MG/L)    PARAMETER 30.  MEAN   11.533 LIMITS    5.751  LOW    5.782  HIGH   17.285
X31   TOTAL VOLATILE SOLIDS (MG/L)      PARAMETER 31.  MEAN  149.538 LIMITS   25.011  LOW  124.52A  HIGH  174.549
X1A   PH LAB                           PARAMETER 1A.  MEAN    7.614 LIMITS     .288  LOW    7.335  HIGH    7.894
X37   HARDNESS FROM CA AND MG           PARAMETER 37.  MEAN  198.587 LIMITS   37.439  LOW  161.148  HIGH  236.026
X36   ALKALINITY AS CACO3               PARAMETER 36.  MEAN  219.000 LIMITS   65.160  LOW  153.840  HIGH  284.160
X38   CALCIUM          MG/L             PARAMETER 38.  MEAN   49.200 LIMITS   10.496  LOW   38.704  HIGH   59.696
X39   MAGNESIUM        MG/L             PARAMETER 39.  MEAN   17.429 LIMITS    2.569  LOW   14.860  HIGH   19.997
X41   POTASSIUM        MG/L             PARAMETER 41.  MEAN    2.236 LIMITS     .687  LOW    1.549  HIGH    2.923
X99   RIVER MILEAGE
X100  TIME

PARAMETER 19.:   MEAN      .069   MAX     .2250   MIN      .0100   VARIANCE     .003   SAMPLE SIZE  15.
PARAMETER 20.:   MEAN      .000   MAX     .0000   MIN      .0000   VARIANCE     .000   SAMPLE SIZE   6.
PARAMETER 22.:   MEAN      .175   MAX     .5100   MIN      .0290   VARIANCE     .020   SAMPLE SIZE  15.
PARAMETER 23.:   MEAN     2.111   MAX    3.1000   MIN    1.6500   VARIANCE     .219   SAMPLE SIZE  12.
PARAMETER 24.:   MEAN      .662   MAX    1.8600   MIN      .0650   VARIANCE     .472   SAMPLE SIZE  13.
PARAMETER 25.:   MEAN      .139   MAX     .2400   MIN      .0410   VARIANCE     .005   SAMPLE SIZE   5.
PARAMETER  2.:   MEAN     6.071   MAX    8.1000   MIN    3.7000   VARIANCE    2.846   SAMPLE SIZE   7.
PARAMETER  3.:   MEAN     2.987   MAX    7.3000   MIN      .4000   VARIANCE    6.673   SAMPLE SIZE   8.
PARAMETER 29.:   MEAN   286.133   MAX  418.0000   MIN  197.0000   VARIANCE 3642.409   SAMPLE SIZE  15.
PARAMETER 30.:   MEAN    11.533   MAX   36.0000   MIN    1.0000   VARIANCE  107.838   SAMPLE SIZE  15.
PARAMETER 31.:   MEAN   149.538   MAX  237.0000   MIN   92.0000   VARIANCE 1714.269   SAMPLE SIZE  13.
PARAMETER 18.:   MEAN     7.614   MAX    8.1000   MIN    7.1000   VARIANCE     .091   SAMPLE SIZE   7.
PARAMETER 37.:   MEAN   198.587   MAX  291.0530   MIN  117.6890   VARIANCE 2739.447   SAMPLE SIZE  10.
PARAMETER 36.:   MEAN   219.000   MAX  269.0000   MIN  179.0000   VARIANCE 1677.333   SAMPLE SIZE   4.
PARAMETER 38.:   MEAN    49.200   MAX   77.0000   MIN   29.0000   VARIANCE  215.289   SAMPLE SIZE  10.
PARAMETER 39.:   MEAN    17.429   MAX   24.0000   MIN   11.0000   VARIANCE   19.802   SAMPLE SIZE  14.
PARAMETER 41.:   MEAN     2.236   MAX    4.2000   MIN     .5000   VARIANCE    1.416   SAMPLE SIZE  14.
```

Table 60. Site 810 FALL

SITES 900

YEAR 73 TO 73
MONTH 3 4 5 6 7
DAY NO RESTRAINT
HOUR NO RESTRAINT

TYPE NO RESTRAINT

BASIN NO RESTRAINT
SUBBASIN NO RESTRAINT
LOCATION NO RESTRAINT

COUNTY NO RESTRAINT
TOWNSHIP NO RESTRAINT
LONGITUDE NO RESTRAINT
LATITUDE NO RESTRAINT

PARAMETER VALUE NO RESTRAINT

DEPTH NO RESTRAINT

T TEST (.05)

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X19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.046	LIMITS	.025	LOW	.021	HIGH	.071
X20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.070	LIMITS	.049	LOW	.021	HIGH	.119
X23	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	1.556	LIMITS	.402	LOW	1.154	HIGH	1.958
X24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.229	LIMITS	.229	LOW	-.000	HIGH	.458
X25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X03	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	188.400	LIMITS	9.479	LOW	178.921	HIGH	197.879
X30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	12.800	LIMITS	11.459	LOW	1.341	HIGH	24.259
X31	TOTAL VOLATIBLE SOLIDS (MG/L)	PARAMETER 31.	MEAN	99.600	LIMITS	8.263	LOW	91.337	HIGH	107.863
X18	PH LAB	PARAMETER 18.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	105.204	LIMITS	42.504	LOW	62.700	HIGH	147.708
X36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X38	CALCIUM MG/L	PARAMETER 38.	MEAN	24.000	LIMITS	8.957	LOW	15.043	HIGH	32.957
X39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	11.200	LIMITS	1.841	LOW	9.359	HIGH	13.041
X41	POTASSIUM MG/L	PARAMETER 41.	MEAN	2.560	LIMITS	1.274	LOW	1.286	HIGH	3.834
X99	RIVER MILEAGE									
X100	TIME									

PARAMETER 19.	MEAN	.046	MAX	.0720	MIN	.0230	VARIANCE	.000	SAMPLE SIZE	5.
PARAMETER 20.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 22.	MEAN	.070	MAX	.1250	MIN	.0340	VARIANCE	.002	SAMPLE SIZE	5.
PARAMETER 23.	MEAN	1.556	MAX	1.9000	MIN	1.1000	VARIANCE	.105	SAMPLE SIZE	5.
PARAMETER 24.	MEAN	.229	MAX	.4600	MIN	.0000	VARIANCE	.034	SAMPLE SIZE	5.
PARAMETER 25.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 2.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 3.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 29.	MEAN	188.400	MAX	194.0000	MIN	175.0000	VARIANCE	58.300	SAMPLE SIZE	5.
PARAMETER 30.	MEAN	12.800	MAX	28.0000	MIN	4.0000	VARIANCE	85.200	SAMPLE SIZE	5.
PARAMETER 31.	MEAN	99.600	MAX	108.0000	MIN	91.0000	VARIANCE	44.300	SAMPLE SIZE	5.
PARAMETER 18.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 37.	MEAN	105.204	MAX	120.9270	MIN	86.9840	VARIANCE	292.708	SAMPLE SIZE	3.
PARAMETER 36.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 38.	MEAN	24.000	MAX	27.0000	MIN	20.0000	VARIANCE	13.000	SAMPLE SIZE	3.
PARAMETER 39.	MEAN	11.200	MAX	13.0000	MIN	9.0000	VARIANCE	2.200	SAMPLE SIZE	5.
PARAMETER 41.	MEAN	2.560	MAX	3.8000	MIN	1.1000	VARIANCE	1.053	SAMPLE SIZE	5.

Table 61. Site 900 SUMMER

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SITES                 900

YEAR                   70 TO  73
MONTH                   8      8          10
DAY                NO RESTRAINT
HOUR               NO RESTRAINT

TYPE               NO RESTRAINT

BASIN              NO RESTRAINT
SUBBASIN           NO RESTRAINT
LOCATION           NO RESTRAINT

COUNTY             NO RESTRAINT
TOWNSHIP           NO RESTRAINT
LONGITUDE          NO RESTRAINT
LATITUDE           NO RESTRAINT

PARAMETER VALUE    NO RESTRAINT

DEPTH              NO RESTRAINT
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T TEST (.05)

X19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.068L	MITS	.017	LOW	.051	HIGH	.085
X20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.000L	MITS	.000	LOW	.000	HIGH	.000
X22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.097L	MITS	.039	LOW	.058	HIGH	.136
X23	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	1.627L	MITS	.169	LOW	1.458	HIGH	1.796
X24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.148L	MITS	.069	LOW	.079	HIGH	.217
X25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.000L	MITS	.000	LOW	.000	HIGH	.000
X02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	.000L	MITS	.000	LOW	.000	HIGH	.000
X03	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	.000L	MITS	.000	LOW	.000	HIGH	.000
X29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	172.947L	MITS	26.955	LOW	145.992	HIGH	199.902
X30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	6.053L	MITS	1.249	LOW	4.803	HIGH	7.302
X31	TOTAL VOLATIBLE SOLIDS (MG/L)	PARAMETER 31.	MEAN	101.421L	MITS	17.183	LOW	84.238	HIGH	118.604
X18	PH LAB	PARAMETER 18.	MEAN	.000L	MITS	.000	LOW	.000	HIGH	.000
X37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	98.126L	MITS	19.745	LOW	78.381	HIGH	117.871
X36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	.000L	MITS	.000	LOW	.000	HIGH	.000
X38	CALCIUM MG/L	PARAMETER 38.	MEAN	21.062L	MITS	4.476	LOW	16.586	HIGH	25.539
X39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	10.476L	MITS	1.683	LOW	8.794	HIGH	12.159
X41	POTASSIUM MG/L	PARAMETER 41.	MEAN	1.814L	MITS	.278	LOW	1.537	HIGH	2.092
X99	RIVER MILEAGE									
X100	TIME									

PARAMETER 19.	MEAN	.068	MAX	.1340	MIN	.0000	VARIANCE	.001	SAMPLE SIZE 19.
PARAMETER 20.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE 0.
PARAMETER 22.	MEAN	.097	MAX	.3000	MIN	.0100	VARIANCE	.007	SAMPLE SIZE 19.
PARAMETER 23.	MEAN	1.627	MAX	2.4400	MIN	1.1600	VARIANCE	.123	SAMPLE SIZE 19.
PARAMETER 24.	MEAN	.148	MAX	.5100	MIN	.0600	VARIANCE	.020	SAMPLE SIZE 19.
PARAMETER 25.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE 0.
PARAMETER 2.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE 0.
PARAMETER 3.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE 0.
PARAMETER 29.	MEAN	172.947	MAX	360.0000	MIN	120.0000	VARIANCE	3127.386	SAMPLE SIZE 19.
PARAMETER 30.	MEAN	6.053	MAX	12.0000	MIN	2.0000	VARIANCE	6.719	SAMPLE SIZE 19.
PARAMETER 31.	MEAN	101.421	MAX	208.0000	MIN	53.0000	VARIANCE	1270.813	SAMPLE SIZE 19.
PARAMETER 18.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE 0.
PARAMETER 37.	MEAN	98.126	MAX	222.7560	MIN	70.3830	VARIANCE	1373.601	SAMPLE SIZE 16.
PARAMETER 36.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE 0.
PARAMETER 38.	MEAN	21.062	MAX	48.0000	MIN	15.0000	VARIANCE	70.596	SAMPLE SIZE 16.
PARAMETER 39.	MEAN	10.476	MAX	25.0000	MIN	8.0000	VARIANCE	13.662	SAMPLE SIZE 21.
PARAMETER 41.	MEAN	1.814	MAX	3.0000	MIN	1.0000	VARIANCE	.372	SAMPLE SIZE 21.

Table 62. Site 900 FALL

SECTION VII

APPENDIX B

Table 63. CHANGES IN SOIL PHOSPHORUS FRACTION RESULTING FROM RADICAL SOIL DISTURBANCE[a]. ALL VALUES REPORTED AS ppm/g.

Date[b]	pH	Avail. P	Al-P	Fe-P	Ca-P	Total-P
Site (near 405) - Organic Soil Paddy - First Year Production						
6-22-73	6.2	40	89	7.6	48	1240
7-10-73	6.1	22	109	5.8	70	831
7-11-73	6.2	14	159	2.4	29	643
7-13-73	6.0	27	164	8.2	71	793
7-30-73	6.3	70	200	7.6	58	793
Site 115 - Organic Soil Paddy - Fourth Year of Production						
6-22-73	7.0	54	85	8.1	64	1072
7-10-73	71	71	100	14.	70	1167
7-11-73	6.9	34	158		26	1219
7-13-73	6.6	80	157	8.5	98	1080
7-30-73	6.8	40	157	11.	118	905
Site 125 - Organic Soil Paddy - Fourth Year of Production						
6-22-73	6.8	35	122	11.1	75	1147
7-10-73	6.8	136	137	6.5	175	1181
7-11-73	6.9	16	173	4.9	42	1011
7-13-73	6.5	471	75	.8	67	1144
7-30-73	6.9	88	230	19.1	129	1118
Site 215 - Organic Soil Paddy - First Year of Production						
6-22-73	7.0	33	138	6.9	119	909
7-10-73	6.8	63	103	3.8	83	856
7-11-73	7.0	26	164	3.3	40	806
7-13-73	6.6	34	87	4.7	115	1022
7-30-73	6.9	61	199	30.	87	682

Table 63. (cont.) CHANGES IN SOIL PHOSPHORUS FRACTION RESULTING FROM RADICAL SOIL DISTURBANCE. ALL VALUES REPORTED AS ppm/g.

Date	pH	Avail. P	Al-P	Fe-P	Ca-P	Total-P
Site 705 - Mineral Soil Paddy - First Year Production						
6-22-73	7.2	2.9	13	2.5	22	412
7-10-73	6.9	15.0	44	14.0	80	573
7-11-73	7.1	2.4	48	2.2	13	617
7-13-73	7.0	0.6	85	24.0	98	897
7-30-73	6.9	47.0	249	33.0	100	701
Site 710 - Mineral Soil Paddy - (3-5) Year of Production						
6-22-73	7.1	5.9	4.4	2.4	6.9	374
7-10-73	6.8	60.0	69.0	14.0	85.0	371
7-11-73	6.7	7.6	55.0	7.0	17.0	495
7-13-73	6.9	37.0	65.0	19.0	103.0	487
7-30-73	7.2	.6	34.0	10.0	63.0	503

[a]Soil analyses conducted at field moisture conditions except pH and total soil phosphorus.

[b]At all sites the date 7-10-73 represents 1 minute after, 7-11-73 24 hours after and 7-13-73 72 hours after major soil disturbance.